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DIGITAL SYNTHESIS

The Ultimate Guide

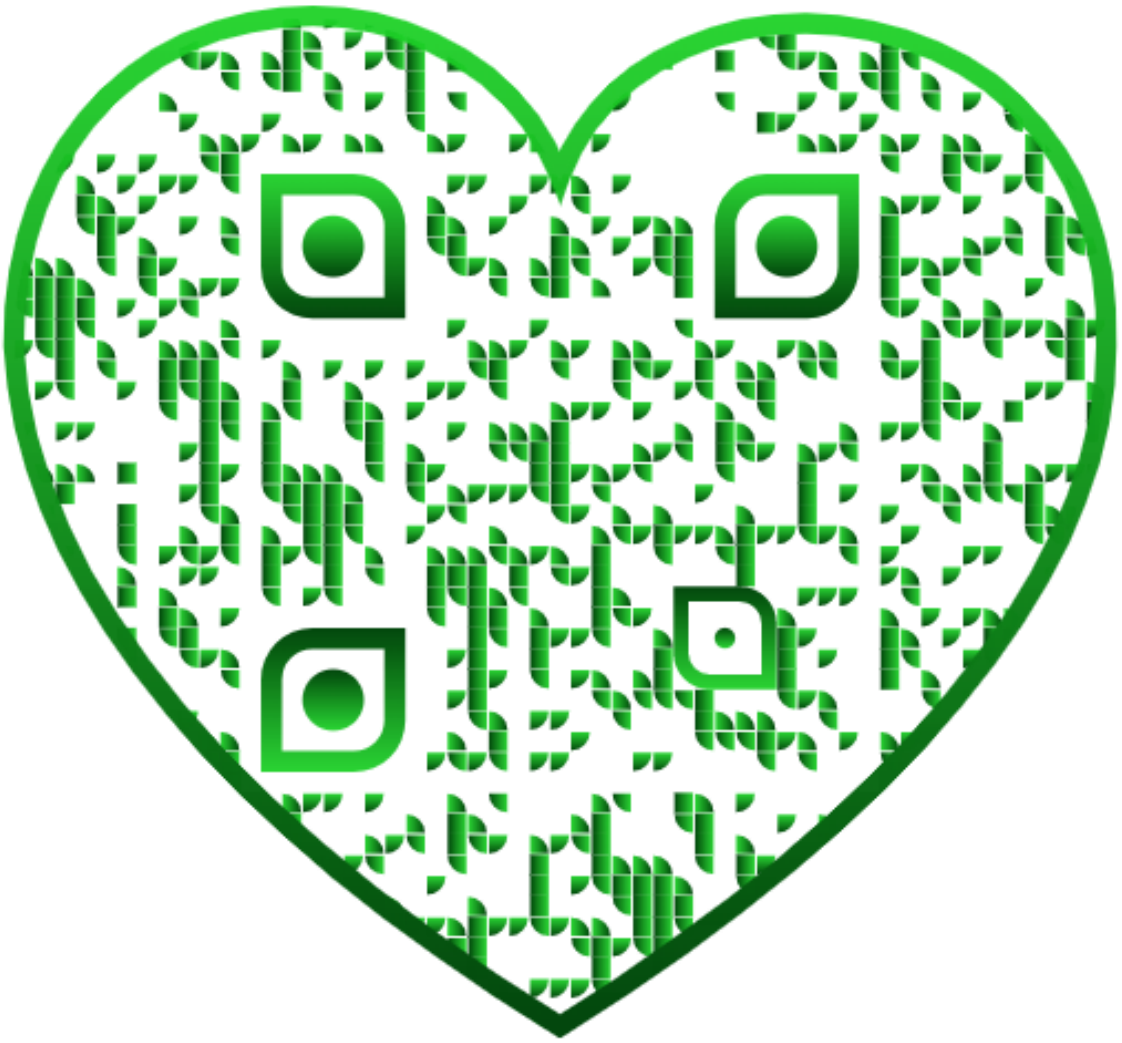
+

Reviewed

Arturia MiniFreak
Oberheim OB-X8
Cherry Audio Sines

From additive to wavetable cutting-edge sound creation explained

FUTURE



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Editor's Note

Where next?

At the time of writing, we're into the final few weeks of 2022. As often happens at this time of year, I've found myself spending a lot of time taking stock of what's happened over the past few months as well as wondering about what's to come.

On the music technology front, that's involved revisiting some of my favorite gear releases of the year, which include the likes of Polyend's hugely creative Play sequencer, PWM's brilliantly unpredictable debut semi-modular, Malevolent, and a late entry, this issue's cover star, the Arturia MiniFreak. I've also been trying to make a few predictions about what we can expect to see on the music technology front in the coming year.

There are a few fairly obvious guesses we can make. It seems highly likely that 'intelligent' and AI-powered software applications will continue to appear at an increasing pace. While some of these so-called 'smart' tools occasionally have a whiff of snake oil to them, more often than not the deployment of things like machine learning algorithms have proven capable of making mixing and mastering a genuinely faster and smoother process. I'd like to see more use of these kinds of tools for sound design and synth patch creation.

It's also likely we'll see more of spatial audio and Dolby Atmos, with Apple seemingly fully behind the technology now that it's integrated into Logic Pro.

On the Apple front, maybe this will be the year Logic finally comes to iPad? The current iPad Pros could definitely handle it, so it would make sense. If so it's likely we'll see an increased focus on DAWs coming to mobile, touch-friendly formats.

Thanks for reading EM!

SI TRUSS
EDITOR-IN-CHIEF

Editor's choice

FROM THE ISSUE:
Oberheim OB-X8
It's great to see the Oberheim making a proper return to the market. We've been excited about the arrival of the OB-X8 polysynth for months – find out what we make of it now we've finally had a chance to explore it in-depth.
Review: Page 36

FROM THE ARCHIVE:
Minimoog masterclass
The most iconic monosynth of all time is returning to production (see New Gear on page 10.) Rediscover what makes makes the Minimoog Model D so special with our masterclass tutorial.
See more: bit.ly/EMminim

AROUND THE WEB:
Two Shrimps
Frighteningly young jazz fusion duo DOMi and JD Beck are two of our favorite new players. See why in this excellent Tonight Show performance (featuring excellent use of a toilet as keyboard stool.) **See more:** bit.ly/EMdomjd

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CONTENT
Editor-in-Chief
Si Truss simon.truss@futurenet.com

Content Director, Music
Scott Rowley scott.rowley@futurenet.com

Art Editor
Steve Dawson steve.dawson@futurenet.com

Production Editor
Jem Roberts jem.roberts@futurenet.com

Editor at Large: James Russell
Contributors: Daniel Griffiths, Bruce Aisher, Hamish Macintosh, Scot Solida, Rob Redman, Dave Clews, Jerry Kovarsky, Jon Musgrave, Roy Spencer

FUTURE MUSIC GROUP BUSINESS
Advertising Director
Robert Dye robert.dye@futurenet.com

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Head of Print Licensing
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NEW GEAR

THE ORIGINAL MOOG MINIMOOG MODEL D IS BACK IN PRODUCTION AND LOOKING BETTER THAN EVER

Considered by many to be the greatest synth of all time, the original Minimoog Model D was released in 1970. It remained on sale for just over a decade, before production ceased in 1981.

Capitalizing on the analog revival, Moog reissued the Model D in 2016, but took it off the market in 2017 due to a shortage of parts. Now, five years later, it's back, looking as lovely as ever.

We're assured that this new version has the same sound engine and signal path as the original, while also retaining the modifications that were made for the 2016 reissue.

These include a dedicated analog LFO with triangle and square waveshapes, a Fatar keybed with velocity and after pressure available via top panel CV jacks with onboard trimpots, MIDI integration, improved pitch wheel calibration, and a mixer feedback modification which enables you to put he Minimoog Model D into overdrive and make it scream simply by turning a knob.

New features for 2022 include a spring-loaded pitchwheel that will center itself when it's released (a popular artist request, we're told) and updates to the MIDI functionality.

Otherwise, it's very much the Minimoog Model D that so many of us know and love: a three-oscillator, monophonic analog synth that features the classic Moog low-pass ladder filter and a mixer section.

Of course, the market has changed since Moog last had a Minimoog in production – Behringer can now offer you its own low-cost hardware version of the Model D, and it's also created a 4-voice polyphonic edition in the shape of the Poly D – but here Moog is playing in a different, higher-end market, emphasising its new instrument's authenticity and quality.

To wit, every Moog Model D is built by hand to the original specifications, and each instrument is housed in a locally sourced Appalachian cherry cabinet with a legacy-inspired walnut stain and hand-finished aluminum chassis.

It's available now priced at $4,999.

SEQUENTIAL UNVEIL THE TRIGON-6, DAVE SMITH'S FINAL SYNTH

When he died earlier this year, Sequential's Dave Smith was mourned both in the synth community and beyond. However, it turns out that he had one final design to share with us: the Trigon-6.

"Dave Smith was very excited about the Trigon-6 and we believe it continues his legacy as a synth creator," says Sequential CEO David Gibbons, confirming that this was the last synth that Smith contributed to.

The six-voice Trigon-6 offers three newly-designed discrete voltage-controlled oscillators per voice, and simultaneously selectable waveshapes (triangle, sawtooth, reverse sawtooth, and variable-width pulse). Beyond this there's a two- and four-pole ladder filter design with feedback and drive, and analog voltage-controlled amplifiers.

Sequential make no secret of the fact that the Trigon-6 takes inspiration from the Prophet-6 and OB-6, two of its previous releases, and inherits their Poly Mod section. Modulation sources include filter envelope and oscillator 3 (both with bi-polar control), while destinations include oscillator 1, 2, and 3 frequency, oscillator 1, 2, and 3 pulse width, low-pass filter cutoff and feedback.

There's also a 24-bit/48kHz dual digital effects section that features reverbs, modelled digital and analog delays, chorus, flanger, phase shifter and ring modulation. If you want to maintain a fully analog signal path, true bypass is your friend, and you can also make use of the fully analog stereo distortion.

Other features include a multimode arpeggiator and a polyphonic step sequencer that offers up to 64 steps and up to six notes per step. The full-size, four-octave Fatar semi-weighted keyboard is velocity-sensitive and responds well to aftertouch.

To ensure a truly intuitive programming experience, the Trigon-6 has a knob-per-function design and keeps you away from any menu diving. Producers can toggle between preset and live panel modes, the latter of which switches the synthesizer into a 'what you see is what you hear' configuration mode.

The Trigon-6 is available now priced at $3,499.

AODYO'S ANYMA OMEGA PUTS PHYSICAL MODELING INTO A HYBRID HARDWARE SYNTH

Cast your mind back a couple of years and you may recall the Aodyo Anyma Phi, a three-oscillator monophonic desktop synth that put particular focus on its physical modeling capabilities. Now the same technology has been used to power the Anyma Omega, a 16-voice polyphonic, four-part multitimbral synth that's available in both desktop and keyboard flavors.

As you may be aware, physical modeling synths use complex mathematical algorithms to emulate not only the sounds of acoustic instruments, but the way they're actually played. Each of the Anyma Omega's three oscillators can use either a physical model, a virtual analog model, a digital model, a noise source or an external input.

You can then treat each voice with up to five effects, choosing from the likes of resonators, filters, EQ, dynamics, mix effects, timbre shapers and delays. You can also access up to 16 modulators – envelopes, LFOs, audio, shapers and the like.

A total of 123 different module types is currently available, including 44 sources, 33 effects and 46 modulators. Easy tweaks to your sounds can be made with the 14 macro parameters that control each patch's main characteristics, and you can also adjust individual parameters for each module via the display and controls.

For those who want a completely standalone synth, Aodyo has the keyboard version of the Anyma Omega. This features a 49-note Fatar semi-weighted aftertouch keyboard, a wooden surface ribbon controller, pitch/mod wheels and a 3D sensitive touchpad with audio sensing.

The desktop version loses the keyboard, pitch/mod wheels and touchpad but does still have a ribbon controller, albeit a significantly smaller one.

The Anyma Omega has already been funded on Kickstarter, but you can still pledge $880 to receive a desktop version or $1,211 to secure a keyboard version. You can expect delivery in September 2023.

REFX RELEASES VANGUARD 2: MUCH-LOVED SOFT SYNTH RETURNS FROM THE PLUGIN GRAVE

Released in 2004, reFX's Vanguard used to be a pretty big deal in the soft synth world, but it eventually started to be outgunned by its rivals, and was discontinued in 2016. However, the plugin is fondly remembered and still has its fans, which explains why reFX have now – finally – released version 2.

Vanguard remains a three-oscillator synth, but it now boasts a cleaner vector-based UI, 10 new wavetables, two new filter types, a new delay type, new reverb and distortion effects, synced LFOs and more. There are also 136 completely new factory presets, but happily, the synth is also compatible with projects that use Vanguard 1. Load up your old songs and the sounds you used before will immediately load up, too (that's the theory, anyway).

Vanguard 2 also appears to be more usable than its predecessor, with an 'advanced' sound librarian featuring three columns and offering colour-coded tags, bookmarks, favourites and a dedicated location for user presets. Sounds can be previewed instantly, you can search as you type, and it's possible to filter presets by categories and tags.

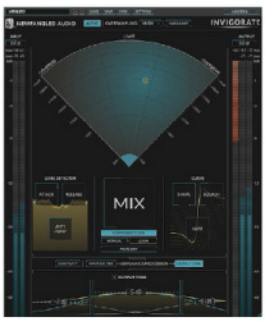
Available now, the 'Complete' version of Vanguard 2 comes with all 16 Vanguard expansions that were previously sold by reFX, which equates to a total of 2,440 presets and 63 one-shot drum samples. It runs on PC and Mac in VST/AU/AAX formats.

NEWFANGLED AUDIO SAY THAT THE INVIGORATE PLUGIN IS A BUS COMPRESSOR LIKE NO OTHER

If your current bus compressor isn't getting you to the sonic place you want to be, Newfangled Audio are offering a potentially revitalizing alternative in the shape of its new Invigorate plugin.

The company begins their pitch by positing that compression, limiting, and overdrive are all the same thing, and that Invigorate can handle the lot. Not just on your drum or mix bus, either, but on any element of your track. The plugin enables you to morph between compression, limiting and overdrive on a radar-style interface, with a Mix control being used to set the amount of processing you want to apply. You can also tailor the frequencies of the sidechain signal with the Sensitivity control, and overdrive the dynamics processing via the Input Exciter.

You also have Output Tone controls to play with – these adjust the sound of the wet signal before it's mixed with the dry – and it's possible to adjust the gain curve with Shape, Squash and Gate controls.



Newfangled Audio say that they have implemented a gain compensation algorithm so you're not tricked into thinking that 'louder is better', while oversampling and anti-aliasing are designed to make certain that the sound is clean, with no digital aliasing.

Invigorate runs on PC and Mac in VST/AU/AAX formats, priced at $99. A 30-day demo means that you can try before you buy.

WALDORF'S STREICHFETT PLUGIN BRINGS THAT '70S ADULT MOVIE SOUND TO YOUR DAW

When Waldorf launched their Streichfett hardware string synth in 2014, they said that its general vibe was along the lines of "how adult movies sounded thirty years ago". This being the case, it stands to reason that the new plugin version resides in a similarly raunchy sonic wheelhouse.

The interface on this software port mirrors the hardware pretty closely. Designed to emulate the classic string machines of the '70s and '80s, Streichfett offers a dual sound engine comprising a polyphonic string section and an eight-voice solo section.

You can add movement to the string section with the ensemble effect, while other processors include adjustable phaser and reverb. There's also an animate effect that can be used to modulate the strings' registration, opening up additional sound morphing possibilities. Although the Solo section sounds have names like Bass- E-Piano and Clavi, the tones themselves bear little resemblance to 'real' instruments, but are instead designed to complement the strings.

Playing and controlling the Streichfett should be pretty straightforward, but there's plenty going on under the hood, and you can expect "rich and creamy pads unlike any other instrument".

Streichfett runs on PC and Mac in VST/AU/AAX formats and is available now priced at around $35.

KORG HEAD BACK TO THE ‘90S AND ‘00S WITH MICROKORG, ELECTRIBE AND KAOSS PAD PLUGINS

Korg have added microKorg, Electribe and Kaoss Pad plugins to their synth-packed software collection. This ensures that version 4 of the eye-catching bundle – which already included emulations of (among others) Korg’s M1, Wavestation, Mono/Poly, Polysix, ARP Odyssey, Triton , Prophecy and miniKorg 700s synths – is the most comprehensive yet, containing a total of 11 synths, two effect processors and one drum machine.

Version 4 has its sights set on the ‘90s and ‘00s, with 2002’s microKorg being the most notable addition. The plugin emulates the “sound, behavior and look” of the original, including its analog modeling oscillator, filter and amp sections. The effects section, arpeggiator and – of course – the vocoder are here, too, though the iconic gooseneck microphone doesn’t come included.

The Electribe-R is based on iElectribe for iPad, which landed in 2010, but offers expanded beat modes and the effects and step sequencer from both 1999’s Electribe-R hardware and the subsequent mkII version. All the preset data from the iOS versions is here, too.

Finally, the much-loved Kaoss Pad – which we originally saw in 1999 – makes an appearance. This gives you your first opportunity to go under the hood and look at the “complex internal structure” of this dynamic effects processor, but retains the pad control surface that made it so intuitive and easy to use.

All three of the new plugins are available individually at the special introductory price of $100 each, but with its intro price of $299, the full Korg Collection 4 bundle definitely represents a better deal right now. All the plugins run on PC and Mac in VST/AU/AAX formats.

SONICWARE’S LIVEN LOFI-12 REVIVES GRITTY ’80S SAMPLERS

Sonicware have added another product to the Liven range of grooveboxes: the Lofi-12 is designed to emulate the sound of old-school samplers. Promising to “turn everything lo-fi,” this has a 16-bit/12kHz/24kHz sampling engine and a 12-bit sampler mode that’s inspired by ‘80s and ‘90s hardware such as the Akai SP-1200. So, if you’re after that crunchy vintage sampler sound, you should be covered.

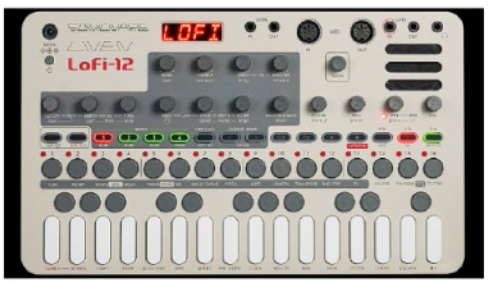
Each of the 128 sample slots offers up to four seconds of mono sampling at 12kHz or two seconds at 24kHz. You can trim stand and end points, adjust the pitch, reverse the playback, filter, use LFO modulation and a whole heap more.

Samples are automatically mapped to the Liven Lofi-12’s keyboard so they can be played at different pitches. You also get 80 suitably gritty lo-fi sounds to get started.

There’s a 4-track 64-step sequencer, too; you can switch sounds for each phrase or step so that you can combine multiple sounds in a single song. You can save up to 64 patterns, sub-divide steps and use parameter locking to record knob tweaks into your patterns. There’s also a Laidback knob that can be used to delay the start of the selected sound when you’re creating those off-kilter ‘drunk beats’.

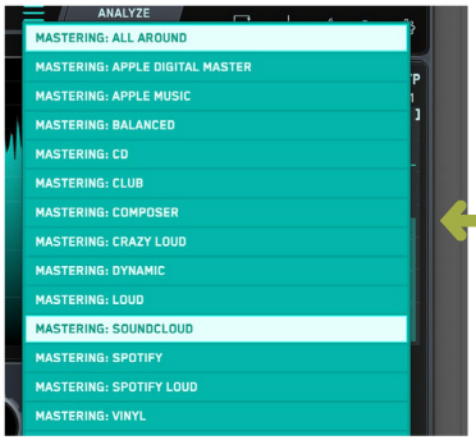
11 types of track effects are joined by six reverbs on the master output. Cassette tape and vinyl simulators can be applied at this stage, too. Audio I/O comes on 3.5mm jacks, and there’s also MIDI and sync I/O. The Lofi-12 has a built-in speaker and can be powered either by six AA batteries or an AC adapter (not supplied).

The Liven Lofi-12 costs $239 and is available to order now.



Mastering the Mix
Limiter

AI plugins have grown in popularity in recent years, with growing computing power putting smart plugins in the palms of the consumer. This is particularly true of plugins intended for mastering activities, where loudness and balance can take precedence over subjective qualities. Limiter is just one of these smart mastering plugins, but with some other features that set this apart from other developers' AI offerings. In this short tutorial, we'll take a look at Mastering the Mix's Limiter plugin and see how it can help to achieve the desired loudness, without sacrificing clarity. You can buy the plugin or download the demo from Mastering the Mix's website.



1. Presets

First, let's tell Limiter how loud we're going to want our master. To do this, click on the icon with three horizontal lines in the preset bar, which opens a dropdown menu of the available presets. You'll notice that some of the presets are named after a general use case or environment, such as Dynamic, Loud or Club. Other presets are named after specific formats or streaming platforms, such as Vinyl, Apple Music or Youtube. Each of these presets has a different target range on the Dynamic Range, LUFS and dBTP meters. Select a preset to get started.

2. Analyze

Once you've selected a preset, play your track during the loudest section then hit the Analyze button on the right of the presets bar. Limiter will listen to your tracks loudness, dynamics and transients, then make suggestions for how to set your Gain, Attack, Link and Ceiling parameters according to the preset you've selected. Note that it does not suggest NRG and PCH settings, as these are more subjective to personal taste and the style of each track. Mastering the Mix also recommends leaving the Release setting on Auto for more musical processing.

3. Adjust

The white portion of the Gain level is where it recommends us to bring the fader to, and the white arrows on the Attack, Link and Ceiling parameters signify how Limiter's smart analysis suggests we apply those settings. After adjusting Limiter's settings to match the smart engine's suggestions, your levels should be within the recommended Dynamic Range, LUFS and dBTP ranges for your chosen preset. To listen to the effect Limiter is having on our signal, we can bypass the plugin with the right hand button underneath the Ceiling parameter.

4. Release

Mastering the Mix suggests using Limiter's auto-release function, which is set to On as default. If we want to set the release ourselves, though, we can toggle the Auto button underneath the release dial to turn the control on. Both the Attack and Release times values are in milliseconds, so you can adjust your settings to the exact values you want. As with all of Limiter's controls, you can double click on a parameter to enter a specific value, or hover your cursor over a parameter to find out what it is and how to use it.

Limiting for every scenario

While mastering has historically been seen as a perplexing task, the various loudness standards that are now required by each music streaming platform or marketplace have only added confusion to the process. To tackle this, Limiter comes with a selection of loudness standards, or 'Presets' designed to aid you in getting your track to the correct loudness level for every popular music platform. Limiter also lets you emphasize transients using the PCH slider, dial in some rich harmonic distortion with the NRG slider, and audition exactly what the plugin is doing using the Delta Mode button. This plugin can do much more than just limiting, then.

5. Delta Monitoring

If you do want to set your own Release value, it can be helpful to listen to exactly what Limiter is doing to your signal while you adjust the release length. To do this, let's turn on the Delta monitoring function by toggling the left hand button underneath the Ceiling dial. This allows us to listen only to what Limiter is removing. Not only is this helpful for dialing in your limiter settings, it also highlights to you if there's an element in your mix that is considerably louder than other elements, thus engaging your limiter too early.

6. Energy and Punch

Mastering the Mix Limiter has two more sliders on the left of the Gain fader that allow you to add even more processing to your audio signal. Increasing the NRG fader adds harmonic distortion, perfect for adding color and grit to your master, as well as increasing the level. The PCH fader musically enhances the transient information of your signal, adding punch and impact to it using its intelligent transient detection algorithm. Because these features are pre-gain, you will need to re-analyze your signal after applying NRG or PCH to get a new target gain level.

7. A/B Comparison

When limiting during mastering, generally the goal is to apply as transparent processing as possible, while getting the track to the correct volume level. Although Limiter makes suggestions as to how best to set up your limiter, we may want to manually adjust some of them depending on the scenario. In this case, the A/B function lets us compare two states of the plugin and how it affects our master. In this case, we're comparing the suggested Limiter settings with added NRG and Punch on page A, with a faster attack time without NRG or PCH on page B.

THE ULTIMATE GUIDE TO DIGITAL SYNTHESIS

From wavetable to FM, additive to granular; digital synth engines are having a resurgence in both hardware and plugin form. But how do all these complex-sounding setups work, and when should you reach for each variety? This issue, let's explore all that digital synths have to offer...

Like all of history's great rivalries, the long-fought battle between analog and digital ebbs and flows. Early digital synths were seen as convenient, affordable and more powerful than analog rivals, but their ubiquity and supposed 'cold' sound drove many musicians back into the warm embrace of old-fashioned circuitry.

Following the affordable analog boom back in the 2010s, recent years have seen a resurgence of digital synthesizers once again, with the likes of Korg, Modal, Waldorf and Arturia releasing sure-fire future classics that are proudly digital-by-design.

What do we mean when we say 'digital synthesizer'? On the whole, most modern synths include at least some elements of digital technology and the plugin market is digital from top to bottom. What we're talking about here, however, are instruments that use synthesis techniques that can only exist in the digital realm. A plugin emulation of a Minimoog such as Arturia's Mini V, say, is technically a digital instrument, but as its approach to synthesis is based on replicating the workflow of a subtractive synthesizer built around analog circuitry, we'd call it a virtual analog instrument.

What we're focussing on this issue are instrument types such as FM, additive and wavetable synths – methods of creating sound that for reasons such as stability, complexity or memory, couldn't feasibly be replicated by a fully analog instrument. While there are plenty of purists who will tell you that all digital synths are poor approximations of their analog counterparts, in reality – as we'll see – nothing could be further from the truth. From the glitchy sample-mangling of granular synthesis to the complex timbres of FM, there are plenty of reasons to embrace the power of DSP-driven synthesis.

ESSENTIAL ADDITIVE SYNTHS

Unlike FM or wavetable synthesis, additive synths haven't yet had much of a resurgence in the hardware realm (although we think it's about time Kawai's '80s classics got a revival). There are still plenty of great additive plugins out-there though.

In terms of dedicated additive instruments, Native Instruments' Razor – designed by Berlin producer Errorsmith – is a longtime favorite. Arturia's Pigments has had a powerful additive engine since version 3 too. What's more, lots of common software synths have easily overlooked additive capabilities. Logic's Alchemy, Ableton Operator and Xfer Serum all have additive engines onboard, so you may well have an additive synthesizer in your arsenal without even realizing it!

What is additive synthesis?

Unlike subtractive synthesis – ie, that found on most analog synths, where you start with a harmonically rich waveform and remove frequencies using filters – additive synthesis builds from the ground up.

Kawai's K5 is an additve classic from the early days of digital synthesis

It uses Fast Fourier Transform theory, which says that any audio signal, no matter how complex, can break down to a series of sine waves; you can recreate any waveform with the right combo of sine 'building blocks'. Pile up sine waves (ie, harmonics) at related harmonic integers at different amplitudes, and you get familiar waveforms.

For example, start with a simple 100Hz sine as the fundamental frequency, then stack up more sine waves at odd-integer harmonic intervals from the fundamental (ie, one at 300Hz, another at 500Hz) to create a basic square wave.

Take that same initial 100Hz sine and add sines at odd- and even-integer multiples of the fundamental (200Hz, 300Hz, 500Hz, etc) and you've created a sawtooth wave.

This process of adding together so-called 'partials' to create more complex waveforms is the basis of additive synthesis. Things get more timbrally interesting once you mix in additional sine waves at inharmonic intervals from the fundamental, modulate the amplitudes of these harmonics over time, alter the phase of individual sines in relation to each other, and mix in noise for more bite.

Sounds technical, but it's essentially the same concept at work in many classic organs, where pipes or drawbars stack simple sounds, altering the instrument's timbre.

When to use it...

The USP of additive synthesis is that it can do a whole variety of things, but it specializes in dissonant drones, bell sounds and airy pads

If your synth has a partials editor, start by experimenting with how different arrangements sound. Randomly scattered 'spikes' of partials will create dissonant chime sounds. Creating 'waves' of partials that rise and fall across the spectrum will generate formant or vocal-like sounds. Try modulating the amplitude (level) of partials as a method for creating interesting pads.

Some synths, such as Arturia Pigments or NI's Razor, simplify the additive creation process with tools that can arrange and modulate the distribution of partials without the need to edit everything from scratch yourself. Let's see this in action...

Arturia Pigments 3's Harmonic engine has a user-friendly take on additive synthesis, with tools to automate distribution of partials so users needn't draw them in by hand. This starts by dictating how many partials a sound will have, variable from 1 to 512.

Ratio adjusts the pitch relationship between each partial, which has a significant effect on the tonality of the sound. Parity, meanwhile, adjusts the balance of odd and even harmonics, altering the character of the waveform that's created.

Pigments' Imaging section is particularly interesting. This lets users control the spread of partials across the stereo field. Users can split odd and even harmonics left and right (split mode), spread out clusters of partials (periodic mode) or randomize distribution.

What is FM synthesis?

Frequency modulation synthesis is notoriously complicated, and for those more used to working with analog-style subtractive instruments, it's easy to be put off by jargon such as 'operators', 'algorithms', 'carriers' and 'modulators'. When you break the concept down to its fundamentals, however, it's not actually as impenetrable as you may think.

The basic principles behind FM are actually common in the analog realm. Essentially, FM involves taking a simple waveshape – typically a sine wave – and altering its timbre by modulating it. If you've ever used an LFO to create vibrato by applying it to an oscillator's pitch, then you've encountered a basic form of FM. The difference is that FM synths use audio-rate oscillators as opposed to the lower frequencies of an LFO. This audio-rate modulation is fairly common in the analog realm too; synths like Arturia's MiniBrutes, Moog DFAM or the IK UNO Synth Pro all let users create a simple form of FM by using one analog oscillator to modulate the pitch of another.

So if FM is common to analog synths in one form or another, why do we associate FM synthesis with digital instruments? Well, instruments that we'd typically call true 'FM synths' take this concept and run with it, using more complex routings as well as dedicated envelopes in order to finely adjust the relationship between each oscillator. Because of the precise, stable tuning and complex processes required to make this work, it's usually only possible with DSP-powered instruments.

Let's tackle some of that jargon. 'Operators' are essentially FM-speak for oscillators. In classic FM synths, these are usually sine waves, and the key difference between FM operators and analog-style oscillators is that each operator has its own amp envelope, meaning it can be individually shaped before being routed to an output or to modulate another operator.

Operators divide into categories of 'carriers' and 'modulators'. Carriers are operators routed to an output, meaning they're heard in the finished sound, modulators are routed to modulate the pitch of a carrier, so we only hear the effect of their modulation, not an output from the modulator itself. The arrangement of these operators is controlled by something known as an 'algorithm', which is essentially a map indicating which operators are assigned as carriers or modulators and where each is routed.

The other key difference is that their tuning is usually labeled as a ratio. These are harmonic ratios – ie, multiplying the incoming pitch by a certain number. Tuning an FM operator to '2:1' equates to '2x' the pitch, meaning it'll be an octave above an operator tuned to '1'. An operator tuned to 3:1 will be pitched an octave and a fifth above the original note; 4:1 gives you two octaves, and 5:1 gives you two octaves and a third.

These ratios, combined with the individual envelopes, are key to FM sound design. Modulate a carrier tuned to 1:1 by a modulator with a higher ratio and hear it add high frequency harmonic content. Use the modulator's envelope to create a slow fading attack or short decay, to hear how this creates changes to the sound over time.

Three great fm synths

Once seen as a relic of '80s synth design, FM is back in fashion for both hardware and software

This setup we've described above is essentially that of Yamaha's DX7 – probably the best known FM synth of all time, and the one that brought the concept to mass market attention. Its 6-operator, 32 algorithm design is essentially the blueprint used as the core of most FM synths today. Modern hardware and software often builds on these ideas though. Common enhancements include the ability to add more operators, change the operator waveshape or even – as in the case of things like Korg Opsix or Kilohearts Phase Plant – use alternative forms of modulation synthesis such as ring mod, phase distortion or wavefolding.

The DX7 was notoriously difficult to program too. Thankfully, the new wave of FM synths that have emerged in recent years are far more user-friendly, allowing musicians to get hands-on for live tweaking and performance.

Elektron Digitone

While its FM engine has only four operators, Digitone is fully multi-timbral, so can create four distinct FM voices at once. It's paired with a creative step sequencer, which is great for inspiring patterns and lines. We particularly like Digitone for FM drum programming.

Tracktion F.'em!

For a long time Native Instruments' FM8 (and before that FM7) was the king of virtual FM synths. Tracktion's recent release looks set to take that crown though, with a complex but well-organized FM engine combined with virtual analog and sampled elements.

Korg Opsix

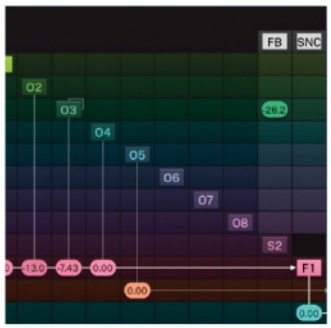
Opsix is easily the most intuitive hardware FM synth we've tried. Its sliders make blending and editing operators remarkably tactile. It goes beyond the classic DX7 format though with multiple modulation modes, such as ring mod, filter mod and wavefolding.

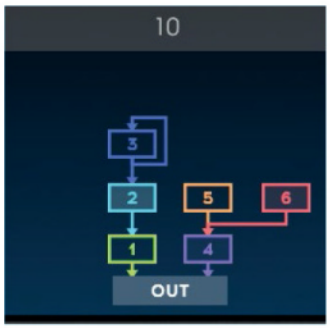
The basics of FM

Let's run through the basic elements of FM sound generation. We'll use Tracktion's dedicated FM plugin F.'em! But these principles are shared by any FM synth, including free DX7 emulation Dexed

01 FM synth oscs are called 'operators': a simple sound generator with tuning controls and amp envelope. Operators can be carriers, routed to the output, or modulators, routed to modulate a carrier, so we hear its effect on the carrier, not the operator itself. Operators can also be routed to the output and a carrier at once.

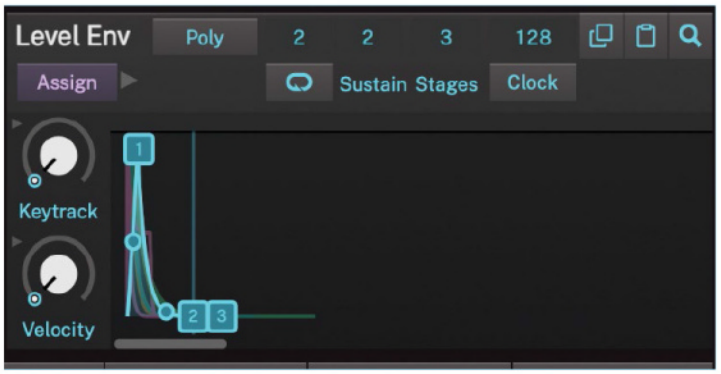
02 Routing of operators is handled either by an 'algorithm' – a preset selection of routing configurations – or a matrix, which let users assign routings freely. Try a single carrier and modulator, then add more. Even if an algorithm uses all of a synth's operators, you can turn off or reduce the level of those you don't require.



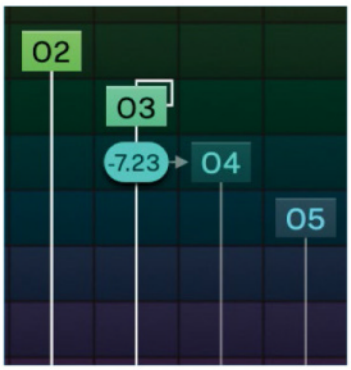


03 Operator pitch is a ratio. Above 1.00 multiplies the root pitch (for a higher pitch), and below 1.00 divides the pitch (for a lower note). Set your carrier to 1.00 and try modulating it with higher/lower pitched operators to hear the effect. Operators have a fine/freq tuning parameter, letting you adjust tuning by Hz.

04 Adjusting the amp envelope of a modulator lets us create changes to a sound over time. Try modulating your carrier with an operator with a high ratio (maybe 6:00), and set the modulator's envelope to have an immediate attack and short decay. The result adds a percussive 'attack' element to the main sound.



05 To take things further, try using another operator to modulate an existing modulator. This can add further harmonic complexity and change the relationship between operators over time. FM synths allow feedback too – this lets an operator modulate itself. In practice this has the effect of turning a simple sine into a saw wave.



POWER TIP

It can be tempting to try and use all your operators in any patch, but it's often unnecessary. Many modern FM synths let you use complex waveforms for operators as well as simple sines. In this case, you may only need subtle modulation to create something really interesting.

What is granular synthesis?

Logic Pro's Alchemy (originally launched by Camel Audio) can do granular, additive and more

Like wavetable synthesis, granular has samples at its heart. Granular synthesis is, broadly, the opposite of wavetable synthesis though – where a wavetable synth builds on the capabilities of a sampler by stacking multiple waveforms and morphing between them, granular synthesis breaks a sample into pieces, creating additional scope from a sampled sound by dividing it, not multiplying. It uses the same principle used to power the time-stretching capabilities of most DAWs by looping tiny elements of a file, or grains, allowing each to be sustained without altering the pitch.

What granular and wavetable synthesis have in common though is that both come to life with a little modulation and variation. In the case of granular synthesis, this usually involves modulating the position, length or pitch of grains to add variety to a patch. The results created will, naturally, depend on the source material used, but with a sample with plenty of timbral variety, the results can be ethereal or glitchy. One common technique is to play back multiple grains of a source sample at once, creating a 'grain cloud' effect, so called because of the 'fluffy', ambient tones that can be achieved.

Randomization is a common tool found in granular synths. Whereas wavetable synths tend to work best with smooth modulation that 'morphs' the sound from one table to another, granular synths can create ear-catching effects using both subtle and overt randomization. This can be a great way to create ear-arresting sounds that change in an unpredictable and unusual manner.

When to use it...

Granular synthesis is one of the most overtly digital approaches out there. In that sense, it excels at the creation of complex, otherworldly sounds that are a world away from the fuzzy warmth of analog

As a sample-focussed approach, granular synthesis is heavily influenced by the source sound used. Most dedicated granular synths will come stocked with a library of source sounds, but we'd recommend exploring your own. Vocal samples are a staple source for granular experimentation. Try loading up an acapella and experiment with creating droning, choir-like pads. Alternatively, as is a common approach in the modular realm, try using a granular tool to resample and deconstruct another instrument, such as a classic analog synth or even a drum machine.

Position

A granular synth's 'position' parameter dictates where, in the sample, the looped grain is taken from. Sweeping or modulating this adds variety to a sound.

Size

Adjusting the size of a granular loop is another way to create ear-catching, glitchy effects. Decreasing the length can create sounds that 'ramp' up as they become harsher and more atonal.

Density

A density control defines how many grains will be played back at once. Increasing this can create ambient 'grain cloud' effects. Many synths offer options to spread these out across the stereo field.

GREAT GRANULAR SYNTHS

Granular synthesis has found particular popularity with modular users, likely due to its usefulness for resampling existing sounds, plus how well it works with modulation sources and randomization. Mutable Instruments' Beads – a successor to their popular Clouds module – is one of the best granular Eurorack devices. Make Noise Morphagene and Qu-Bit Nebulae are excellent too.

On the plugin front, granular capabilities can be found in a host of popular plugins. Logic users can make use of the DAW's stock synth Alchemy, while Live Suite owners can use the Max-powered Granulator II, and Reason users get the excellent Grain device. Arturia Pigments and Kilohearts Phase Plant both pack granular capabilities. For a dedicated instrument, meanwhile, check out Audio Damage's Quanta.

What is wavetable synthesis?

Wavetable synthesis is nothing new; it first appeared in the hardware realm in the early '80s with the launch of Wolfgang Palm's PPG Wave, later followed by a string of influential hardware synths created by PPG successors Waldorf. It has really come to the fore in the 21st century though, becoming almost the de facto synthesis method for modern plugins.

Native Instruments' 2007 Massive is the synth responsible for the modern wavetable boom. Its powerful, versatile sound and copious modulation options defined the growling, frequency-filling sound of modern DnB and American EDM. Its popularity has inspired no shortage of evolutions, the most notable being Xfer Records' Serum, but wavetable oscillators are also a key part of Arturia Pigments, Kilohearts Phase Plant, Bitwig's Polymer, Ableton Wavetable and KV331 SynthMaster, to name a few. In hardware we have ASM's fantastic Hydrasynth, Modal's Argon8 and Waldorf's Quantum.

Wavetable synths are essentially a form of sample-based synthesis, using a recorded sound as the primary source for each oscillator. What makes wavetables different from a straightforward sampler is the ability to morph or evolve that sampled sound. This is possible because wavetables aren't just a single static sample, but actually a stack of individual waveforms called 'subtables' or, more commonly, 'frames'. Wavetables can contain up to 256 of these frames, and a wavetable synth will always offer some method for the user to move through these, often in the form of LFO or envelope modulation or a manual 'morph' control.

Without movement or modulation, a wavetable synth is effectively no different than a sample-based synth that reads a single cycle waveform. However, the stacked frames of a wavetable allow it to transform from one wave shape to another as you play. In analog terms, that could mean having an osc that morphs from a saw wave at one end of a wavetable to a square at the other. In creative terms it lets users incorporate textural elements like rain or static, or capture the imperfections that come from an acoustic instrument.

The key differences between wavetable synths lies in the methods used to play back and modulate the wavetables themselves.

Beyond the oscillators, wavetable synths tend to adhere to classic subtractive synth structure, using filters, an envelope-controlled amp and onboard effects. Due to the emphasis on movement, wavetable synths tend to come with extra modulation options, certainly including LFOs and envelopes, often joined by more complex sequencers and modulation generators.

Wavetable engine popularity in the plugin realm is due to their versatility. As with a sampler, you can make a wavetable osc sound however you want. Unlike standard samplers, wavetables can sound more natural or varied as you're not simply playing the same sound each time.

They're great for pads and atmospheric patches, adding interest to longer, droning sounds. Wavetables are great for impersonating vintage synths and acoustic instruments too; they can replicate the natural variety inherent in both analog oscillators and real instruments.

Three great wavetable synths

Wavetable synths are now everywhere, in hardware and plugin form

For much of the past two decades, the wavetable synth sphere has been dominated by two all-conquering plugins – first Native Instruments Massive, then Xfer Records Serum. Both are a little past their prime now. Massive has been superseded by a follow up, Massive X, while countless imitators and rivals have built on the ideas popularized in Serum in recent years, often offering a more modern look and workflow to boot.

There's still something to be said for these modern classics, though. While the interfaces look a little dated, both Massive and Serum are still more than capable of creating a huge range of cutting edge sounds. Serum in particular still boasts a number of features that have added to its longevity, primarily its flexibility when it comes to uploading and editing your own wavetable sources (users can even upload .png image files).

ASM Hydrasynth

There are many great hardware wavetable synths hitting the market, but Hydrasynth is one of the most interesting. Rather than giving preset wavetables, it allows the creation of custom morphing tables selected from a list of 200+ single cycle waves: very fun to use.

NI Massive X

Massive X remains somewhat divisive among fans of the original, but its multitude of unique playback modes and semi-modular routing push wavetable synthesis forward in new ways. Undeniably characterful, even if that does mean it lacks the intuitiveness of the original.

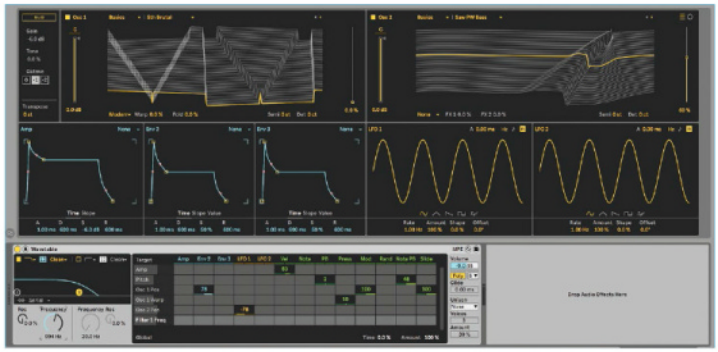
Korg Modwave

The third in Korg's line of digital synth revivals (followinf Wavestate and Opsix.) Its wavetable oscs have 30+ modifiers, 13 types of morphing process, plus the ability to blend between two independent wavetables. Among the most comprehensive hardware wavetable instruments around.

Modulating wavetables

Morphing and modulating wavetable oscillators is key to adding movement and variety to sounds. Let's see how a few different synths approach this...

01 Ableton Wavetable is a fairly straightforward example. It has both LFOs and ADSR envelopes, either of which can be routed to wavetable position in the mod matrix. Here the envelopes can function in looped mode, allowing them to act like custom LFOs.



02 Xfer Serum's breakpoint LFOs are based on the LFOTool volume-shaping effect. Select a traditional LFO shape from the presets, or add or remove breakpoints and bend the curves to dial in many complex modulation shapes.

03 U-He Hive 2 is a particularly user-friendly wavetable synth. Its automated modes will scan through or loop frames without the need for modulation routings. It boasts a unique '2D' mode too, which arranges frames in an X/Y configuration and scans through in two directions at once.

04 Korg Modwave is interesting as it lets users blend two wavetables – rather than simply crossfading, this actually combines characteristics of the two tables resulting in new waveforms in between. Its modifiers also let creative users do things like isolate just the odd or even harmonics of a wavetable, or apply vintage filters.

05 Native Instruments' Massive X is one of the most complex wavetable synths out there. It has ten modes which each 'read' the wavetable oscillators differently. Formant capture, for example, mimics the qualities of a human voice, while Art mode uses hard-sync to replicate the sound of a resonant filter.

POWER TIP

Many wavetable synths have some form of 'smooth' parameter, adjusting how abruptly the oscillator moves between frames. Smoother transitions sound more natural and realistic, but abrupt, stepped changes can create cool glitchy effects.

The hybrid approach

Although in this feature we've been discussing different synthesis types as distinct from one another, in reality it's rare to find a digital synth in 2021 that doesn't blend multiple approaches to some extent. In the plugin sphere, modern 'power synths' tend to offer a variety of engine types as standard. Look at Arturia Pigments, Kilohearts Phase Plant, Apple Alchemy, UVI Falcon or Spectrasonics Omnisphere, to name but a few; all are capable of using at least two or three of the different techniques highlighted in this feature, and allow users to combine and blend approaches for even more sonic variety. In hardware too, even

instruments that focus primarily on one type of synthesis, such as the Digitone, Opsix or Wavestate, all incorporate elements of virtual analog design that deviate from first-generation digital synths. Increasingly common too are instruments that blend authentic analog with digital sound generation, like Korg's Minilogue XD, Arturia's new MiniFreak or UDO's excellent Super 6.

SAMPLE SYNTHESIS

While wavetable and granular synthesis present a more creative take on sample-based synthesis, straightforward sampling remains a powerful tool for sound creation. In both hardware and software, there are countless instruments that make good use of sample engines, from Sequential's Prophet X to Spectrasonics' Omnisphere. Sampling, in a synth context, needn't be a case of simply playing back a static recorded oscillator. By looping, stretching and modulating a source sample it's possible to generate all sorts of tones. Many 'power synths' make use of extensive multisample libraries too, where variations of a sound are used for different notes, velocity levels or in a 'round robin' arrangement to add variety and make the sampled instrument sound more authentic.

VECTOR SYNTHESIS

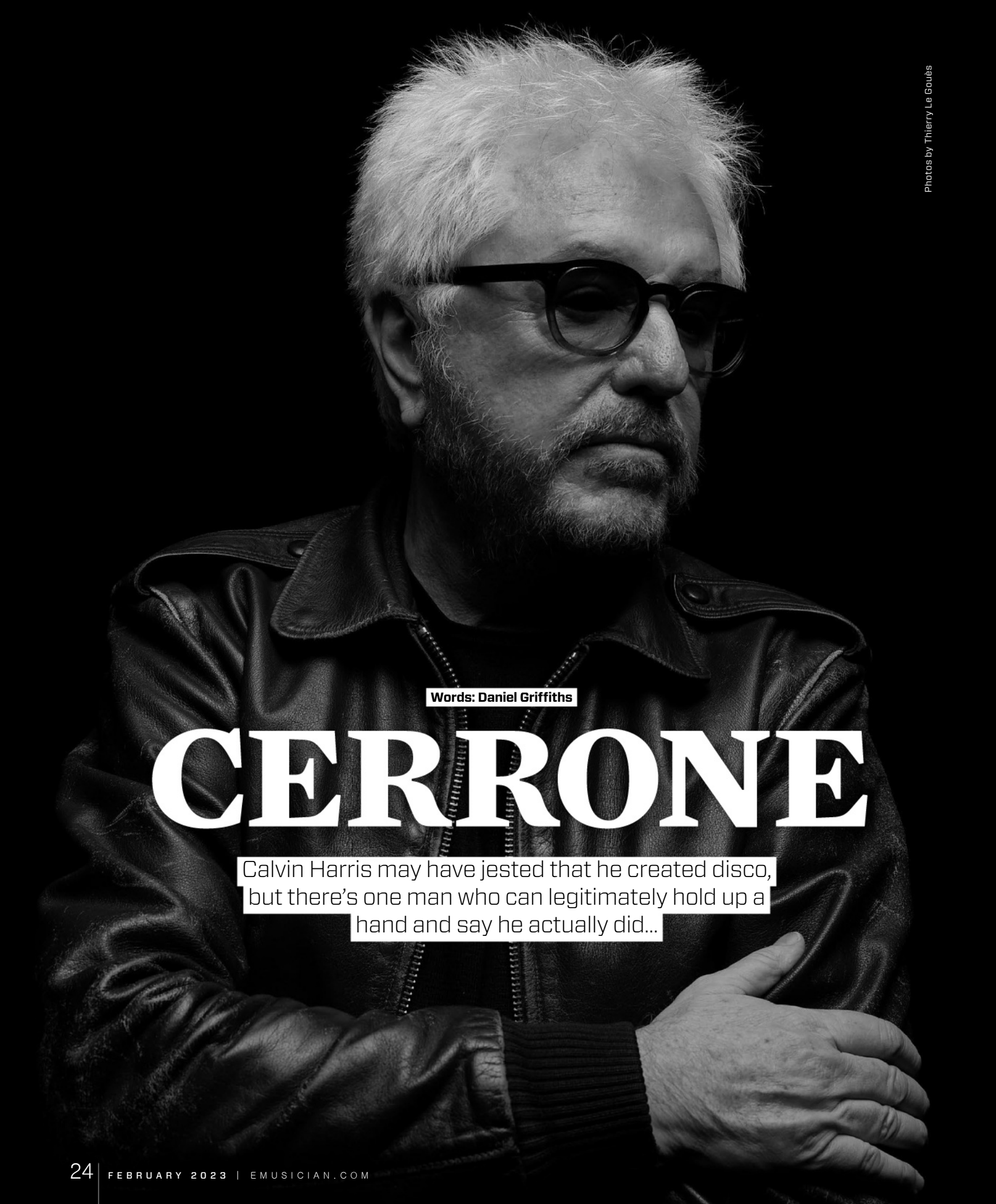
Another synthesis type synonymous with Korg's Wavestation (and Wavestate), although Vector synthesis was first created by Sequential Circuits for the Prophet VS. The concept is fairly simple – four sounds can be assigned to the opposing points of an X/Y axis, and users crossfade between these by selecting any position on the 'vector plane' between them. Typically, this is done by using a hardware joystick, but in many cases LFOs or envelopes can also be used. How each of the four sounds themselves is created differs per instrument – the Prophet VS used four wavetable sources, Yamaha's SY synths offered a choice of sample and FM sounds, while the Wavestation (and Wavestate) allow full wave sequences to be assigned to each point.

WAVE SEQUENCING

Wave Sequencing is a type of sound generation that first appeared in Korg's '90s classic Wavestation, and was revived as Wave Sequencing 2.0 for Wavestate. It's broadly similar to wavetable synthesis, making use of multiple samples to create an evolving sound. However, where wavetable synths stack frames and modulate the transition between them, here sampled waves are placed into a sequence, each with its own pitch and duration settings. These waves could have entirely disparate timbral qualities – a piano sequenced with a synth tone and percussion hit, for example. The Wavestate takes this concept further, with individual sequencer lanes for samples and playback parameters, which allows for the creation of complex polyrhythmic movement.

PHASE DISTORTION

Phase Distortion was developed by Casio in the 1980s as a rival approach to Yamaha's FM synthesis. It works by rapidly altering the phase of an oscillator – ie the position within the wave cycle. Put in ridiculously overly simplified terms, it's a little like cutting and pasting elements of a simple waveform in order to shape a more complex one. Creating a new version by compressing or stretching elements of that existing waveform. Casio's much loved CZ synths also added in a hard sync effect that allowed the oscillators to emulate the squelch of a resonant filter. Phase distortion ultimately lost the popularity war to FM, but you can still find CZ-inspired plugins such as VirtualCZ, Arturia CZ V or KiloHearts Phase Plant.



Photos by Thierry Le Goués

Words: Daniel Griffiths

CERRONE

Calvin Harris may have jested that he created disco, but there's one man who can legitimately hold up a hand and say he actually did...

Fall silent, for you are in the company of greatness. Marc Cerrone – drummer, producer, artist and DJ – has spent the last 50 years carving his own niche and doing his own thing, all the while influencing tens of thousands of musicians and delighting millions upon millions of music lovers.

Now, with *Cerrone On Cerrone*, his brand-new, career-defining album, Cerrone has personally created a seamless journey that reinterprets and merges his catalog of classics in a whole new way.

And with remixes on board from the likes of Joey Negro and Dimitri From Paris, disco has never sounded fresher, more alive, more vital and more ready to – once again – kickstart the creativity of today's new music makers.

With a view to talking 'Love In C Minor', 'Supernature' and beyond, we ensnared Cerrone at his studio in Paris to discuss the new album and his new career as an in-demand DJ, and to ask just how one goes about creating a whole new genre of music?

How did *Cerrone On Cerrone* come about? This is wall-to-wall classic tracks, but it all sounds so fresh.

I was working on a new LP with original songs but I've recently been playing at festivals. Playing to maybe five, seven, 30,000 people. My record company pushed me and convinced me that if I play as a DJ I can play all the big festivals rather than play live. So I've kind of stopped my career as a musician. And I've been DJing more and more.

Was it hard becoming a DJ after so long as a musician and producer?

Ah, but I found the great machine! The Ableton! And with my engineer I started to put samples on my original tracks and soon it was like I was making the album on stage with the public. Then I could go back to the studio and minimize the harmony from certain tracks. Take the original multitrack and work with it. Music is much more minimal these days compared to what it was in the past.

So your DJing influenced the arrangements on the new album?

Absolutely. The LP is like one hour and one minute of my DJ set. At the big festivals my record company was there and they said "Marc, let's offer this to the public. Let them enjoy this at home!" I say "Oh, you think so? Why not?" It's great. I see on YouTube that it's number one and it's working very well. We hope that it's going to push more of the public to come and see me.

Brendan Reilly is the main vocalist for the album. He's such a good fit across the songs.

He was a vocalist with the band Disclosure and I asked him to join me on stage. Sometimes when I DJ I have a bass player, keyboard and electronics and a singer to the front. I asked him to come and he was so perfect. His vocal is so sexy. And that's not easy because a lot of my stuff was with a female singer. But I decided to have one vocal – one sound of voice for the total piece. And I did that specifically to place some distance between myself and many other producers today.

Many other producers use incredible vocals but, for me, when they're finished they sound like the radio or a podcast... They don't sound like the '70s. That's where I burn. I'm a '70s guy! Brendan glues it all together. It's a great mix.

> "So I broke up the band, but after a year I started to feel so bad. I realized that I have to do music."

Let's go back to the classics and 'Love in C Minor.' That fantastic original 16-minute version. How does something like that come about? Was it written like that? Orchestrated? Is it a jam?

Here's the real story, from the beginning. I was a drummer in a band called Kongas who were really successful at the beginning of the '70s. After three or four years I stopped the band. Every year we had 250 concerts... It was just too much.

I decided to quit music. But what I learned when I was with them was that there were two percussionists, left and right, and during the percussion solo I would just... [*stomps on the floor as if playing a kick drum*]. Just to help them along. So they could show-off, brag, whatever. So I broke up the band, but after a year I started to feel so bad. I realized that I have to do music.

So I decided to do one more LP – the last of my life. I asked Alec Constandinos, who was the lyricist and writer for Kongas, to join me. He worked with Demis Roussos and Aphrodite's Child, a lot of good acts. I said 'I want to do something strange. I want to start with... [*stomps on the floor as if playing the kick drum*] and... [*makes the sound of rattling 16-beat hi-hat and tambourine*]'.

So the first day I arrived at the studio in London and they had these small speakers. The Auratones? I said "I'm coming from the stage! Rock and roll! With the big sound!" So we brought in BIG speakers, left and right, for a big sound, and that first day we recorded only the kick... [*stomps on the floor*] All day. We got 20 minutes. I had a click on my ear but every minute-30 seconds you lose it a little. So we kept going back... [*stomps on the floor*] We passed many times. Just the kick in the room. For a pure clean sound. And then we went back and I added the snare, and the hi-hat. So after the first day we have like a drum machine... the drum machine at that time didn't exist. It was very funny for a drummer!

Then we put on the bass, and we put on the guitar and I brought some examples by Barry White to arranger Raymond Donnez and said "I want to harmonize like Barry White, to have a harmonic sound on the brass". And he made an incredible arrangement.

Then we put on the small vocal melody – "Love me, love me". Everyone at the studio during the day was recording a Genesis album and they were looking at me like "What the fuck is this guy doing?!"

But after a few days we had 'Love In C Minor' sounding like it sounds. Everyone was starting to be interested. I'm a young guy, so I invite *everyone* to watch me do the mix. And one of the girls that was there, when the music played she was like, 'Oooh, ooh!' because the music... it was so sexy! And I said to the engineer, "Please, push the red button". And we recorded her. And after, I asked her "Can I keep that?" And she says "Oh, yes!" It wasn't planned. I wasn't thinking. It was just like that.

It's such a perfect modern kick drum sound that would be perfectly at home on any record today.

When you're a drummer you're not supposed to be straight. You have to groove to the band, but because 'Love In C Minor' was such a success that gave us a direction. I was surprised by its success. So I was 21 years old and I thought "OK. I'll do a Cerrone LP with the same format". And that became Cerrone's *Paradise*.

At the time that must have been so radical. To play with no swing, no syncopation...

And within a few weeks Giorgio Moroder arrived with 'Love To Love You Baby'. It was a different BPM, but it was in the same spirit. And from that day onwards a lot of producers started to do the same.

And how about the fast, arpeggiated keyboard parts of those early disco tunes. Are we still pre-sequencer here?
The strings and the brass, they were recorded with a lot of musicians. Totally live. With 'Supernature' the synth was an accident.

One day I got an ARP Odyssey at home, and I tried to use it... and fuck! The first thing I heard was the sequencer, and I looked and I thought "How do I turn it off?" I tried, but all I got was the same repeated note! I tried to find it, to change it, but the fucking sequencer never stopped! But then I started to hold the notes down, and I thought "Hmmm..." And I thought of a bass part to go with it. I tapped my finger on a microphone for the beat, and I recorded that. I sang a melody over that, and Alain Wisniak [*who went on to produce 'Supernature'*] said "Wow! What is this? Let's take it to the studio."

But when we recorded in the studio we didn't use the ARP. Instead, we played it. At half speed, each note, layering and working on the sound. Each sound was there because it needs to be there. We took a week to produce the track.

And I said to [*lyricist and vocalist*] Lene Lovich, "the lyrics need to be strange." The way we treat our planet... it's strange, but it's our home. I wanted to do something around that. And at that time I'd just seen the movie *The Island of Dr Moreau,* and I was shocked by that. And this is the idea I gave to Lene Lovich.

song on the radio, I didn't hear a song. I heard the drummer. And during the year I learnt to play, for each limb to be independent, and at the end of the year we went to the shop... I started to play. And the guy said, "Wow. Your son is gonna be a drummer!"

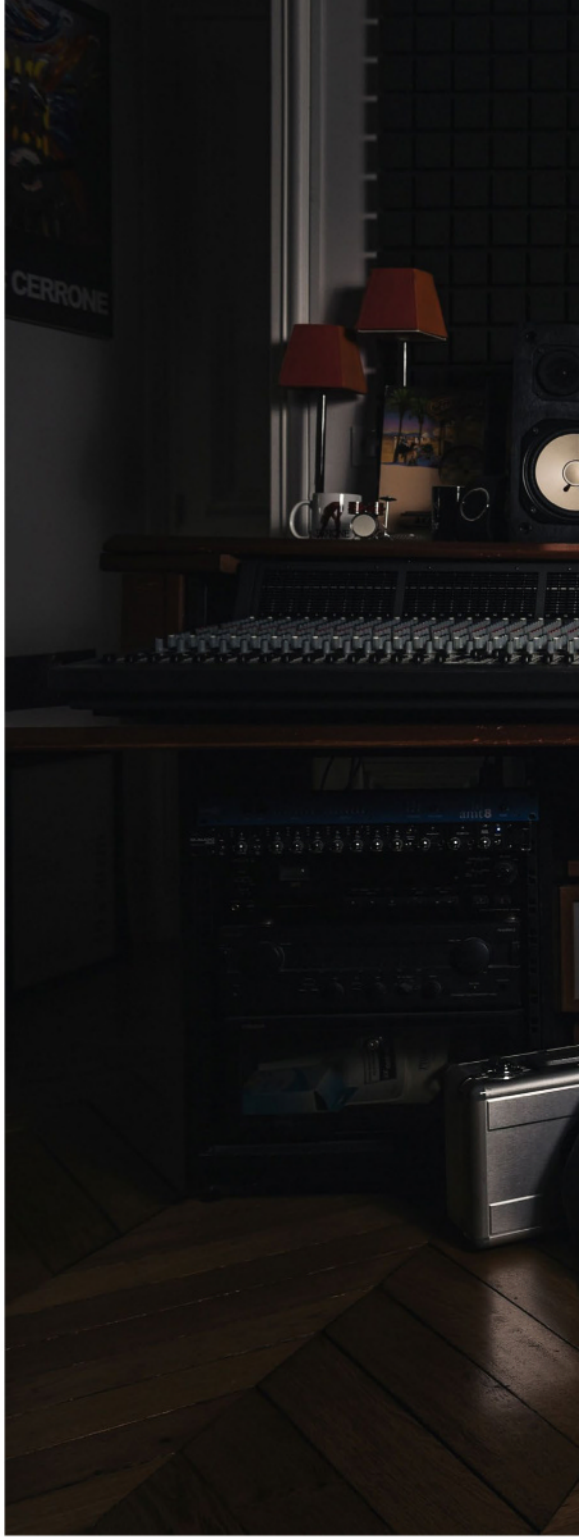
And I convinced a friend to play the keyboard, and the guitar, and at around 14 years old I started to have a great buzz around Paris. I started to play with different bands until I found a great bass player, great guitarist, and that's how we became the band Kongas.

What were your musical influences back in those days?
'70s music was either Deep Purple, Led Zeppelin – the rock sound – or it was pop. I went with rock. Beatles and Rolling Stones? I'm with the Rolling Stones. Beatles are too pop for me.

It's unusual for a drummer to be the leader of a band. Usually a drummer is just the guy at the back.
I don't know. I find that as a drummer I am the band leader.

There was one guy, a keyboard player, and he came out in the front. He said 'Why not?' And that was Quincy Jones. He was the first musician to come in front and use a singer. So why not?

As a drummer, what's your relationship with electronics and machinery, the digitzed side of music creation? What do you think of drum machines?
All of my records, my drums, no matter what, after years and years, I play it myself, not program it.



> "Each sound was there because it needs to be there. We took a week to produce the track."

And for the vocal I tried to find someone who was... androgyne? [*androgynous*] No girl, no man. Just animal. Something like that. And it worked very well.

Let's go back to the start. What got you started as a drummer?
When I was 12 years old I was not a great student. I was always playing drums. The teachers put me out of school. My mother said "If you control yourself I'll buy you a drum kit at the end of the year." And I thought, "Why not?" And from then on, whenever I heard a

When you first created that prototype disco sound, did you know straight away that you had a hit on your hands?
The way I made it, I thought that it was never going to be released. This was just for me. And the record companies said: "Number one: 16-and-a-half minutes? We can't release this. And number two: why are the drums so loud!?"

But we need to hear music for the night, and dancing. It's not for what we hear on the radio. I tried to explain but nobody understood. I'm a drummer! If I was a sax player there'd be sax everywhere! Nobody understood me. But the reaction in the discotheque in Paris? It was Wow... wow!

So you had to release 'Love In C Minor' off your own back?
A friend of mine convinced me to press a few vinyls. I thought "I have nothing to lose". At Island Music in London they told me they could press it for me but the minimum run would be 5,000. I thought "Ohh... 5,000?" But we made it, and I started to give it to some shops, not just the clubs. Five here... three there...

And one of the distributors I sent my record to, he was buying records from America – records by Barry White – and he had records to return to New York, but he sent my records back there by mistake. And when 'Love in C Minor' started to be played in the club in New York the buzz was so big that one guy – Frankie Crocker, the radio DJ – when he played the record he wanted to know more. He said "Call us. Tell us. Who is Cerrone?" He thought it was a big producer who'd changed their name. And they tried to find me in London because a London address was printed on the back of the sleeve. But nobody could find me.

So Frankie Crocker calls Neil Bogart, the boss of Casablanca records, and they decide to make a cover! The name of the band was The Heart and Soul Orchestra. The track was the same... but it was not the same! And that cover version got in the top ten so I heard that in France. I went to New York, Atlantic Records, and I told them "I'm the one! THIS is the original", blah, blah blah. And I signed to Atlantic and Ahmet Ertegun, the boss of Atlantic, took me in and showed me the business. For seven years I learned the maximum from him.

Being signed to Atlantic in New York, you must have visited Studio 54?

We hear that, in New York, a theatre is going to be transformed into a club. And that was Studio 54 and, of course, I got my place there, and I spent a lot of nights there. Don't ask me to give you details. But I was there.

I remember the owner put all the actors and singers and special guests in the VIP area. It was

> "Some DJs are totally instrumental. Even when I started out I always wanted to get my sound. Seriously."

very special. And when 'Supernature' arrived in '77, '78 that put me at another level.

Was there a lot of rivalry between the disco producers at the time. Yourself? Giorgio Moroder? Patrick Crowley?
I never met Patrick. And I only met Giorgio five years ago. I met Donna Summer a lot of times. We'd always meet backstage for awards and TV shows, but never Giorgio.

And when disco broke big, did that feel like vindication? How was that for you?
That wasn't us. Giorgio, Nile Rodgers, Earth Wind and Fire, Kool and The Gang, myself – we were the original. Instead people at the time said "This is disco shit", because it was just a pop song. Record companies all around the world pushed all their artists to record their new single in a disco style. No.

So something like *Saturday Night Fever*?
It was not disco. But it was brilliant. It has what disco has – the atmosphere. And what the Bee Gees created with each song – incredible atmosphere. But I don't like to hear the pop with the disco. Now, the Rolling Stones with 'Miss You' – they made disco? And Rod Stewart with 'Do Ya Think I'm Sexy' – he made disco? But is it just because you have the strings and put the kick drum on every beat? No.

So what *is* the disco sound? If a record is going to be a disco, what does it need?
There is no concept. I just put everything I like into it. Brass, strings, percussion. Why I had this idea – as a drummer – to make this kind of thing? [*shrugs shoulders*]. Giorgio [*Moroder*] made me start to like the pop with the disco. The way he worked with Donna Summer, he was an incredible producer.

But as *Rolling Stone* magazine in the States said, the real disco – the disco for the body, the music that creates the atmosphere – it's built like a pyramid.

First you have the bass of Giorgio, and then the rhythm track and the kick of Cerrone, and then you have the guitar of Nile Rodgers. That's la fondamentale!

So how do you find DJing versus playing live these days?
It's the same. But as a DJ you're by yourself. You're in the middle. If something happens, you're fucked! But the way I've made it, working with Ableton on stage, it's just the same.

When I DJ I'm the one that plays the most vocals on the set. Some DJs are totally instrumental. Even when I started out I always wanted to get my sound. Seriously. I never wanted to sound like someone else. It was never my goal to make a hit. Make a club smash, yes, but never 'a hit'.

Like the *Summer Lovin'* single? With Purple Disco Machine?
He came to me last year to clear a sample from an old track. I think "Who is Purple Disco Machine?" So I checked on the web and Spotify and he's like 300, 400 million plays! I start to listen and he's brilliant. He's one of the artists who gets the heritage – the real disco heritage. He asked me for the clearance – he wanted to use the bridge of my song 'Got To Have Lovin'', which isn't so well known – and I liked his track so much I said "Here, here's the multitrack. Use it!" And you know what? He added this bass... oh! It was so good. Why did I not do that myself? And he sent it to me and I said "Now I want to do the drums! Let me redo the drums." So I did the drums and I sent it back. We went back and forth and we made the track and it's real, *real* disco. It's charted everywhere now.

It's great to see that dance music is still so alive and evolving today.
You know what? I've passed 50 years on stage now and the attitude of the people dancing now? I see the young people and their attitude. It's not like the 1980s or the 1990s. Of course, the people danced back then, but it's not like today. When I'm on the stage and I'm close to the people... it's good to find something, somewhere, that, just for a few moments... it's all good!

The people, they say "We are your future, Cerrone!" This is why, at my age, that I love to be on stage. Right now I'm at home and I'm happy...

But in two weeks I go back. I can't wait! It's my life. ■

Bill Payne — Unsung Keyboard Master

Exploring the techniques of a rock and pop master...

By Jerry Kovarsky

Have you heard the phrase, "if you know, you know?" That's the perfect introduction to the playing of Bill Payne; co-founder of the cult favorite band Little Feat, and a keyboardist who has been part of the fabric of rock and pop music for over 50 years now. Besides his long tenure with Little Feat, he has played/toured with the Doobie Bros, Jimmy Buffet, James Taylor and Leftover Salmon, and recorded with a who's who of rock and pop artists (more on that in a bit). His piano playing has been praised by artists such as Elton John, who stated that he was one of the best rock pianists around. Equally adept at piano, organ, synths and vocals, Bill Payne is an artist that if you know, you know, and if you don't, you need to keep reading.

A Gumbo of Influences

Bill is one of the most virtuosic piano players in rock, with stunning technique and a free-flowing style of playing that encompasses many genres and eras of music. One of the strongest influences in his playing is his mastery of New Orleans style music, with its combination of stride, boogie and primal rock 'n' roll. A great example of this comes from his playing on the Little Feat tune 'Dixie Chicken' from their *Waiting For Columbus* live recording [**bit.ly/EMbpa1**]. Jump to 2:09 to hear his solo, which fluidly moves from rock, to Dixieland, to blues and more. A more recent example comes from this solo playing he did to promote a brand of mics [**bit.ly/EMbpa2**]. Notice how he plays with the time, constantly shifting his feel and mood. A clip from a solo live show lets you really hear those roots in all their glory [**bit.ly/EMbpa3**]. One more example of his New Orleans roots drenched in the blues comes from 'New Coat of Paint' a

> "Bill Payne's piano playing has been praised by artists such as Elton John, who stated that he was one of the best rock pianists around."

track he cut with Bob Seger in 1991.

Payne's rock chops shine in this Little Feat classic – **bit.ly/EMbpa4** – performed solo from that same aforementioned show. Bill's tune 'Oh, Atlanta' is one of Little Feat's bigger hits. The live version – **bit.ly/EMbpa5** –starts with a wonderful New Orleans-style intro, and then moves into a rocking section. I like to showcase his solo performances, because you can really hear and study his playing, like this example from a home show he did back in 1999 [**bit.ly/EMbpa6**]

A Cinematic Sense

Bill can be a very exploratory player, and his nightly feature in a Little Feat concert finds him drawing upon a wide range of colors and moods. He usually blends strings or a pad from his upper keyboard while improvising freely on his lower piano sound. Every night is different: he truly knows how to be in the moment. This performance – **bit.ly/EMbpa7** – starts off aggressively and then moves through many moods, as does this one – **bit.ly/EMbpa8** – but each is entirely different. His solo piano performance of "Through The Eyes Of A Child'**,** from his wonderful solo album *Cielo Norte*, is simply beautiful. And this improvisation – **bit.ly/EMbpa9** – is part modern jazz, part classical.

Other Keyboard Chops

Back in the day, Bill's live rig grew to include a Wurlitzer electric piano, a massive Oberheim FVS-1 4 Voice synth and a B-3 organ; the screengrab below from a 1977 concert shows a Fender Rhodes to his right, with the B3 in front with the Wurly on top, and then the Oberheim synth (pictured below.)

Later he switched to using workstation keyboards and perhaps a clonewheel organ to get those sounds, including his acoustic piano (pictured above.)

Surprising Sessions

Besides his long legacy with Little Feat, Bill has appeared on a wide variety of recording sessions. He has a long history of recording with The Doobie Brothers, even joining the band for touring from 2015 until the end of 2021. That's Bill hammering out the intro to 'China Grove', which the band credits him for the song name. A few other tunes that he played on include 'Jesus Is Just Alright' (organ), 'The Doctor', and he contributed synth parts to both of the Michael McDonald-era Doobie hits 'Minute By Minute' and 'What A Fool Believes'.

That's Payne playing on Bob Seger's hit 'Hollywood Nights', on Bryan Adams '(Everything I Do) I Do It For You', and on Melissa Manchester's mega-pop-hit 'Don't Cry Out Loud'. Other sessions that I would point out include 'Takin' My Time' with Bonnie Raitt, Jackson Browne's 'Here Come Those Tears Again', 'Think About It' for Stevie Nicks, as well as 'Telling Me Lies' for the supergroup trio of Dolly Parton, Linda Ronstadt and Emmylou Harris.

A True Renaissance Man

Bill shares his musical interests with his love of creative writing and photography. He is an excellent writer, and you should visit his website and read the bio prose he put there. It's a beautiful and eloquent treatise on a life in the creative arts. He states, "The uniqueness of how we see the world and how we express that through our art is what gives weight and substance to our voice. Maintaining and developing that voice is an arduous task and involves commitment to the process of discovery along with a disciplined regimen of learning the subject (which involves trial and error), and ultimately, once you have the tools in place, the art of simply letting go." ■

EASY GUIDE

Augmentation and diminution

This month, Dave explores an inspiring technique for expanding and contracting your rhythms and melodies

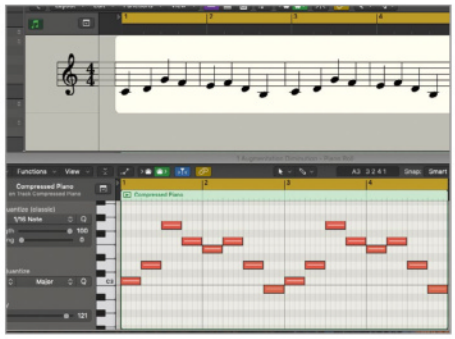
In any field, not just music theory, augmentation and diminution are just words for making things bigger or smaller – you could just use the terms 'growth' or 'shrinkage'.

The way we're using the terms has nothing to do with augmented or diminished chords – although you could easily be forgiven for thinking that, having read the title of this month's guide. What I'm talking about here is augmentation and diminution when applied to rhythm and melody.

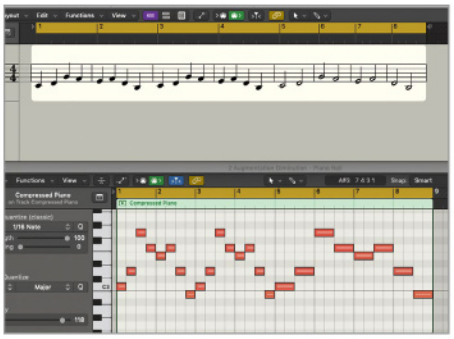
Rhythmic augmentation – the lengthening of the time values of notes in a melody – can be used to imply majesty or reaching a high point, useful for an imposing finale. Rhythmic diminution, on the other hand, is the shortening of the time values of notes, and conveys a sense of building urgency or tension. Meanwhile, intervallic augmentation or diminution can be a useful way to take a melody in a new direction by extending or reducing the pitch intervals between the notes.

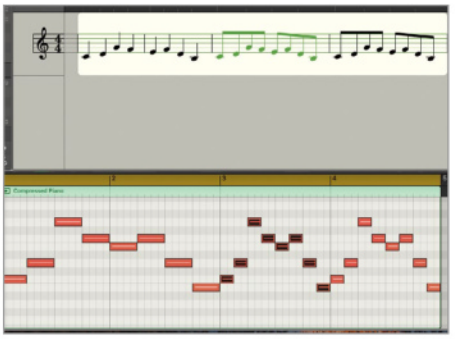
While firmly rooted in classical theory, and of great use to film composers when applying themes and variations to characters in a movie, there's plenty of scope in the technique for application to computer-based music production. It's a great tactic to have in your back pocket if you're suddenly faced with the dreaded writer's block, so follow the steps below and let's see how a bit of sonic stretching and contracting could work for you.

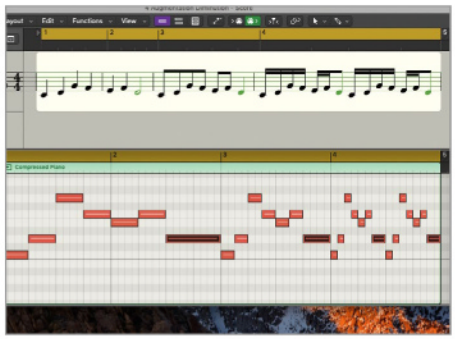
Step by step Rhythmic and intervallic augmentation and diminution



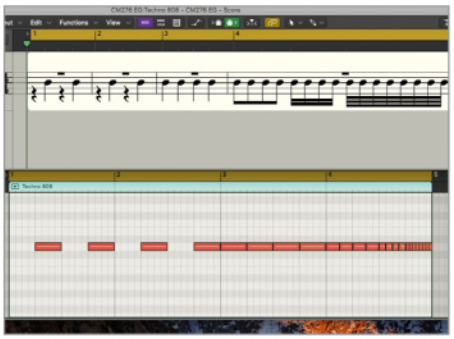
01 Let's start off by looking at how rhythmic augmentation works. Defined as the lengthening of the time values of the notes of a melody, it's officially described as 'a device which adds dignity and a feeling of impressiveness'. To illustrate what that means, here's a basic melody that uses a series of quarter notes, or crotchets.



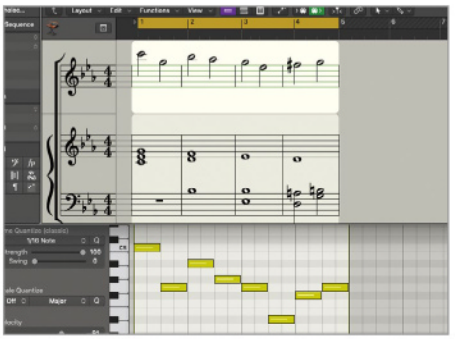
02 In the example shown here, I've applied rhythmic augmentation so that the same pitches are then repeated after the original phrase, but this time the lengths of the notes are doubled to half notes, otherwise known as minims. Playing the project at the same tempo, the melody plays at half speed, bringing an air of finality to the tune.

03 The opposite of augmentation in this context is rhythmic diminution – the shortening of the time values of the notes in a melody. Here's the same original melody again, but this time when the notes are repeated, the note lengths have been halved to quavers, or eighth notes. This has the effect of heightening the sense of urgency or tension.



04 So what happens if you're working with a phrase that contains mixed note values? Here I've changed the last two notes of the original quarter note melody to a single half note. Diminishing this gives us six eighth notes and a single quarter note, and diminishing yet again gives us six sixteenth notes and a single eighth note.



05 Rhythmic diminution is exactly what happens when you get a classic rolling snare fill over a build in a dance track. This example starts off every half note, then doubles the rhythm to every quarter note, then eighths, sixteenths and so on, accelerating the rate over a few bars to build excitement before a drop.



06 So does all this cause problems when playing over chords? Do you have to speed up or slow down the rhythm of the accompanying chords to match the altered melody? Well, not necessarily: have a look at this example of a track with a half-note melody floating over a Cm > Bb > Eb > D > G chord sequence that changes chord every bar.

Recommended listening

GUSTAV HOLST – URANUS (PLANETS SUITE)
A clear-cut example of rhythmic diminution – with repeats of the first four notes, first by trumpets, then tubas, then timpani.

bit.ly/GH_ur

10CC – I'M NOT IN LOVE
Listen out for the intervallic augmentation between the minor third in "I'm not (in love)" and the major third in "so don't (forget it)".

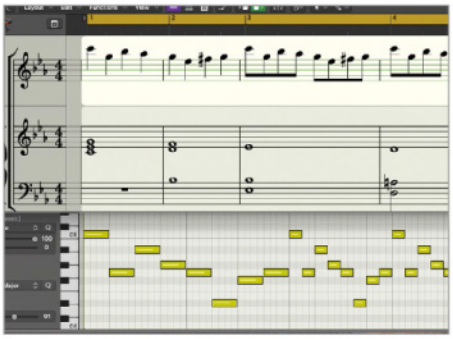
bit.ly/10cc_INIL

Pro tips

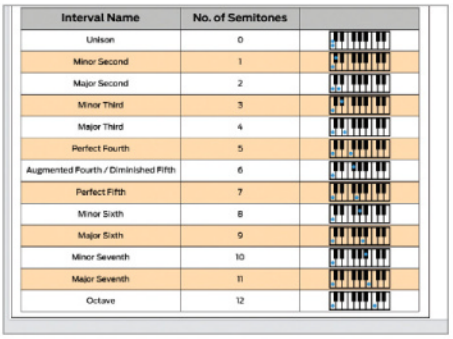
About time
Figuring out the appropriate note lengths when transforming a melody via rhythmic augmentation or diminution can be a bit of a puzzle, but don't worry – your DAW can usually offer some sort of tool to help out by recalculating the relative positions of the notes on the grid mathematically. For instance, Logic Pro X has a useful feature for achieving this kind of effect in the shape of the piano roll's Time Handles function.

See ya later, arpeggiator
As an alternative method for producing rhythmic augmentation and diminution, another way to do it would be to use an arpeggiator to generate a melody, then just automate the rate or note value parameter to change at the appropriate points. You can get some inspiring results just using this method anyway, so why not give it a try?

By Dave Clews
Over the course of his 25-year career, Dave has engineered, programed and played keyboards for numerous artists including George Michael and Tina Turner

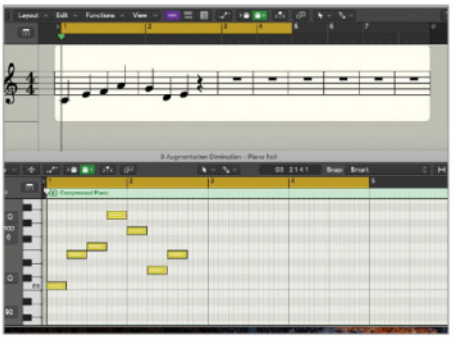


07 Here's the same melody again, over the same chords, with the note lengths halved to quarter notes, then again to eighths, while the chord progression remains the same. Though there's a chromatic interval (F#-G) in the melody, the original version has prepared our ears to expect that and the sped-up version still works with the chords.

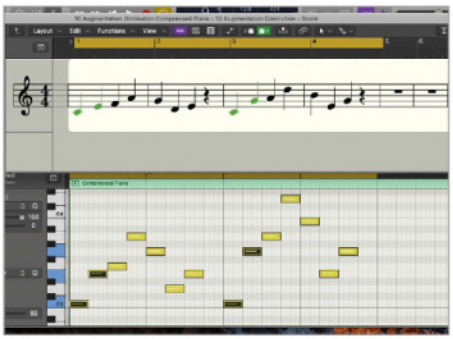


Interval Name	No. of Semitones
Unison	0
Minor Second	1
Major Second	2
Minor Third	3
Major Third	4
Perfect Fourth	5
Augmented Fourth / Diminished Fifth	6
Perfect Fifth	7
Minor Sixth	8
Major Sixth	9
Minor Seventh	10
Major Seventh	11
Octave	12

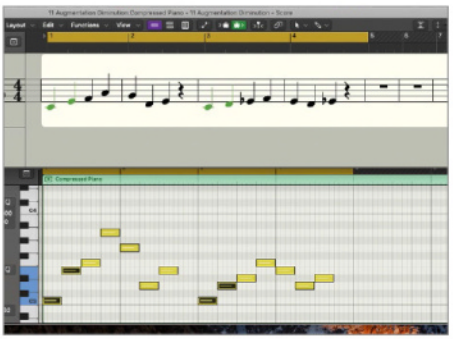
08 Aside from rhythmic augmentation and diminution, you can also use a similar technique known as intervallic augmentation/diminution that changes the intervals between notes in a melody. The distance in pitch between two notes is known as an interval. Shown here is a diagram that names all the intervals found within an octave.



09 With intervallic augmentation, the intervals between the notes in a melody are increased. Unlike the rhythmic version, where the note values are usually doubled or halved, there are no hard and fast rules as to what the intervals should be exactly, they only need to be expanded somehow. Here's a simple melody to illustrate this.



10 Here's the melody again, together with a repeated version that's been tweaked using intervallic augmentation.The tune begins with an interval of a major 3rd between C and E in bar 1, but in the repeated version the interval has been increased to a perfect 5th (between C and G). All of the following intervals have also been extended similarly.



11 You can do a quite similar thing by applying intervallic diminution – using smaller intervals between the notes in the tune. Here's the original melody once again, followed by a repeat that's been 'intervallically diminished' – the interval between the first two notes has been reduced from a major third to a major second, for instance.

12 Lastly, let's look at intervallic augmentation over our previous chord progression. When fitting lines to chords, it can work better if you choose note pitches from within the parent scale of the key you're in. Since this piece is in C minor, I've chosen intervals for the augmented melody that correspond with pitches from that scale.

BLAST FROM THE PAST

Tascam (Teac) Portastudio

This clever combo of mixer and cassette multitracker kicked off the first home recording revolution

Few would argue that the traditional commercial recording studio has seen its day. Sure, there's still room in the industry for those that can afford it to seek out skilled engineers and nicely outfitted rooms, but now more than ever, musicians are doing their own thing their own way. But we shouldn't be so smug as to think that the near-obsolescence of the commercial studio is due solely to the advent of the DAW. Indeed, this sea change began nearly four decades ago with the release of the Teac Portastudio 144.

The idea now seems obvious – exploit the four tracks of a cassette tape by allowing them to be accessed simultaneously and in one direction (all commercial cassettes offered four tracks – two on one side, two on the other). More importantly, the poor quality associated with tapes was circumvented by considerably increasing the tape speed. Though it may sound like a cliché, the Portastudio's designers hashed out the design for the 144 on a napkin at a late-night diner. The result was a 20-pound, 18″ by 15″ combination mixer and multitrack recorder, made possible by advances in tape head design – in theory, it offered a better frequency response than the company's 80-8 1/2″ reel-to-reel recorder.

Initially released under the Teac brand (Tascam was a division of Teac), the 144 sold for $899. And sell it did! From would-be rock stars to established acts, the Portastudio would find a place in many a home studio – most famously that belonging to Bruce Springsteen, who recorded the entirety of *Nebraska* on one.

Tascam would follow up on the success of the 144 with countless variations on the theme, eventually managing to squeeze a full eight tracks onto a cassette with its hulking 688 'MidiStudio'. Other manufacturers including Fostex, Yamaha, Sansui and Vestax would ape the design, applying the aesthetic to dedicated hard disk recorders such as the currently available DP-32SD.

Yet despite the advances in technology since its release, the four-track cassette Portastudio is still popular, often because of its sonic shortcomings, rather than in spite of them. Trent Reznor cohort Alessandro Cortini takes a pair out on Nine Inch Nails tours, and Iron and Wine's 2002 debut The Creek Drank the Cradle was recorded on a 244.

Modern developers also appreciate the four-track aesthetic – one of the first iPad apps was Tascam's own virtual Portastudio, and Teenage Engineering's diminutive OP-1 workstation owes some of its popularity to its four-track tape inspired recorder.

The cassette four-track has a definable lo-fi sound, particularly when approached in a cavalier manner. This sound is, thankfully, quite easy to recreate in software without the hassles of tape head cleaners.

Regardless of whether or not that sound is for you, it can't be denied that the DIY ethic associated with desktop music production owes a considerable debt to those intrepid Teac engineers and their late-night diner sessions!

TECH SPECS

Year of manufacture 1979-present
Original sale value $899
Current price $50+
Number made N/A

Two ways to do the four-track in your DAW

SDS Devices Crap Cassette **FREE**

The name of this Max For Live doodad says it all. This little guy offers all of the lousy artefacts one might expect from a battered old cassette deck: wow, flutter, dropouts, misalignment, hum, noise and distortion – even the dreaded and disastrous 'Spaghettify' effect. Er, remind us again... why do we like cassettes?

www.maxforlive.com

Softube Saturation Knob **FREE**

For a quick blast of lo-fi sound on the cheap, you can use and abuse Softube's gloriously simple Saturation Knob. It won't give you wow, flutter or tape noise, but it will offer some of the saturation for which cassette four-trackers are famous. Strap it across every track for serious lo-fi vibes.

www.softube.com

TOOLS OF THE TRADE

WITH A LEGACY FOR AUDIO EXCELLENCE THAT SPANS 75 YEARS, AKG products have captured the essence of the world's most iconic artists, influencers and podcasters. From our legendary C414 condenser microphone, born in 1971 and a staple in top studios everywhere, to modern-classic headphones like the award-wining K371 and the budget-friendly K240, we provide the tools to take your project or performance to the next level. Create your own legacy with AKG.

75 AKG YEARS

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Oberheim

OB-X8

$5,800

www.oberheim.com

By Bruce Aisher

Strengths

+ It does an amazing job of combining the design elements of three classic synths
+ There are a lot more programming options available beyond the front panel controls
+ It can create that classic-era Oberheim sound with ease, but also offers more flexibility than its predecessors

Limitations

- None of this comes cheap!
- Some Page 2 features might have benefited from dedicated front-panel controls
- No dedicated patch compare button

It's arrived! Could the new Oberheim OB-X8 be a modern classic? Let's take a closer look

The day has finally arrived – a new Oberheim synthesizer is here – and it's the real deal. In a similar manner to Dave Smith's journey back to using the Sequential name, Tom Oberheim can again create synths under his. Interestingly, there is a little more that connects these two almost parallel events than one might first suspect. Before he died Dave Smith made the legendary Prophet-5 live again in the shape of the Sequential Prophet-5 Rev 4. This took elements of circuit design from the two main original production versions (Rev 2 and Rev 3) and recreated them using modern production processes. Core to this was converting the original circuits to make use of surface mount components rather than their larger, and more unwieldy predecessors. In turn, this allowed the production of a more diminutive desktop unit, and the ability to buy an expanded 10-voice version. Besides additional memories, expanded MIDI spec, split/layering and a Vintage knob, most of the core aspects of the original's analog signal path were the same – and it sounded great.

It is therefore not surprising to find that when Oberheim was exploring the possibility of bringing some of his legacy instruments back to life, Sequential were an intrinsic part of the process. They had after all collaborated on the Sequential OB-6 – a fine synth, but not quite the resurrection of the classic '70/'80s Oberheim sound some were craving.

Remember my name

This brings us to the OB-X8. There was a lot of excitement when it was announced, not least because rather than being just another potentially excellent synth, it specifically focused on three revered keyboards from the past – the OB-X, OB-Xa and OB-8. Before diving in with specifics, it's worth pointing out that the OB-X8 has a fully analog signal path, but unlike its predecessors the envelopes and other aspects of the modulation and control of each voice are done digitally. This allows for some interesting possibilities.

All three versions of the Oberheims mentioned above follow a broadly similar design in terms of overall approach, and this is used as a template for the OB-X8. So, we have an eight-voice polyphonic synth, with each voice consisting of two VCOs capable of generating sawtooth, square/pulse and triangle waveshapes. A noise source is also present, with the combined signal routed to a filter section (VCF) and then amp (VCA). The VCF and VCA each get their own four-stage (ADSR) envelope. A dedicated LFO with six selectable waveshape options is routed to

> "The patch banks, containing original presets from the OB synths, sound so authentic"

two separate modulation paths each with their own adjustable depth that is then routed to three hard-wired sources. The first handles the pitch of OSC1 and OSC2 as well as filter cutoff. The second deals with pulse width modulation and volume. Although the destinations can be enabled/disabled individually, this is clearly not as flexible as a more modern modulation matrix. However, it remains true to the spirit of the originals, and the limited options could arguably make editing choices quicker and easier.

To the left of the keyboard additional control comes in the form of two control levers and a second LFO dedicated to vibrato (pitch modulation). Once again the levers are limited to specific functions (pitchbend and mod amount).

If when glancing at the front panel the modulation options look a little sparse when compared to modern synths you will be pleased to know about the Page 2 button. This feature first saw the light of day on the OB-8 and allowed front panel controls to access a further set of modulation-related parameters. Later versions of the OB-8 had these sub-functions noted beneath each knob. The OB-X8 forgoes this and instead employs a Page 2 menu accessible via the small OLED display (although knobs can be used for some functions, but you'll have to memorize what each one does).

The OB-X8 does not exactly replicate every element of the earlier OB synths.

SOME OB HISTORY

The classic era of Oberheim synth design ran from 1975 to 1985. This began with the monophonic Synthesizer Expander Module (SEM) that would form the basis of the hefty 2-Voice, 4-Voice and 8-Voice synthesisers. The latter two could also make use of an optional programmer for storing settings, which laid the groundwork for the OB-X, a direct competitor to the Prophet-5. This was followed by the OB-Xa which replaced the discrete VCO and VCF stages of the OB-X with more cost-effective chip-based designs (from Curtis). Further streamlining tweaks led to the OB-8. By the mid-'80s the Xpander and Matrix synths expanded the available control options by employing computer-controlled and digitally-generated modulation sections. In an era where digital synths were taking over, however, these are a last hurrah and Oberheim were declared bankrupt and eventually sold off to competitors Gibson.

Just over 30 years later Gibson gave the Oberheim trademark back to Tom Oberheim. In a final twist, it was Oberheim's early competitor Sequential (under the helm of the late Dave Smith) who helped develop the OB-X8 we are looking at today.

Instead, Oberheim have taken important elements from all of them and, if necessary, provided different options to cater for the specific approach of each. This means that the VCO is based around the discrete design of the OB-X (and even earlier SEM) rather than the later Curtis chip-based designs, but with a Page 2 option switch the Square Mode can match that in the OB-8. Page 2 also allows you to adjust VCO1/2 and noise levels individually, rather than the limited ON/HALF/OFF choice of the past.

Ober-joyed

Cross-modulation (great for clangorous tones), which was dropped after the OB-X, makes a comeback and sits alongside oscillator sync and filter envelope pitch modulation (from the OB-Xa and OB-8).

Perhaps the most obvious differences between the earlier synths lay in their filter design. Unlike the Prophet-5 that changed the chips employed for its filter between the Rev 2 and 3, but with both still using a 24dB/octave (4-pole) low-pass design, the OB-X8

provides a total of six options covering a 4-pole low-pass and 2-pole low, high, band and notch designs (the later three from the original Oberheim SEM module).

Another difference lay in the envelopes, where the OB-8 had noticeably more linear contours compared to the earlier OBs. This can be switched in Page 2 alongside the different approaches to LFO manifested as changes to the speed and depth range as well as shapes and phase of the modulation.

It should be clear that Oberheim have paid a lot of attention to trying to allow the OB-X8 to recreate sounds from the full panoply of OB synthesizers (and the SEM). It's testament to their valiant efforts that the various patch banks containing original presets from the OB-X, OB-SX (a preset-only synth) , OB-Xa, and OB-8 sound so very authentic to our seasoned ears – but let's save that for a bit later.

Page 2 turner

The Page 2 features discussed so far only scratch the surface of the additional tweaking that can be done on the OB-X8. Delve further and there are options for adjusting voice detune (great for adding extra vintage vibe or fattening unison mode patches), a range of voice panning modes, Vibrato LFO Wave selection, LFO depth envelopes, and a bunch of portamento modes and options. There are also sections dedicated to split and double (layered) mode parameters. This begs the question as to whether there are parameters here that might have been better placed on the front panel with their own controls. The answer will depend on what type of user you are, but I can't help feeling that a few additional buttons and a larger (or separate secondary) screen for clearer parameter editing would have brought the OB-X8 more fully into the 21st century – and without compromizing the vintage aesthetic. Speaking as someone who owned a vintage OB-8, the extended parameter editing is much better here, but I think it could have been even better.

More than nostalgia

Unlike its much older predecessors the OB-X8 has the ability to stay well-behaved in terms of differences between each voice, and like the recent Prophet-5 Rev 4 it has the ability to push back against this with a dedicate Vintage knob that dials in voice-to-voice variability of envelopes, oscillators and filters. In this control section you will also find nods to 'modern' features such as velocity sensitivity and aftertouch which are relayed from the keyboard (which feels very nice to play, unlike my clunky OB-8!). I wonder if Oberheim will add other contemporary features such as LFO clock sync? There is potential for expanding functions via a firmware update.

The OB-X8 is not without its annoyances (for example, there's no dedicated patch comparison button), however it is a lovely synth to use and play. I found it easy to programme all the sounds I used to create on my OB-8 and it has that vintage Oberheim sound in abundance. There are already calls for 16-voice and desktop versions, and I know some (like me) would love to see one with the more '80s inclined horizontal blue stripe aesthetic of the OB-Xa and OB-8.

Clearly, at this price point it is far from a casual purchase, and these days there are many great-sounding virtual instruments to choose from – but will they inspire you in the same way? Another factor is reliability. The discrete nature of the OB-X makes it a more tricky beast to look after if you want to own a real vintage synth. And the OB-X8 covers a wider range of sonic territory, and manages to be both modern and 'vintage'.

This is a lovely and engaging analog synth, and a very welcome return for Oberheim. ■

THE ALTERNATIVES

SONIC PROJECTS
OP-X Pro-II

$179

A highly-regarded virtual analog synth plugin that does a great job of nailing the Oberheim vibe – and with enough flexibility to allow it to cover some other analog synths.

sonicprojects.ch

OBERHEIM
OB-X (used)

$12k+

An original OB-X will set you back somewhere in the region of $12k, but don't forget to set aside some cash for repairs...

ebay.co.uk

SEQUENTIAL
Prophet-5

$3,888

The original OB competitor resurrected. Whilst there are some overlaps, and it is not as complex, some prefer the tone of the Prophet-5 – another classic.

sequential.com

Moog

Mooger-foogers

$249

www.moogmusic.com

By Dave Gale

Strengths

+ The plugin format invites different usage to the hardware
+ Many new features, available from the settings menu
+ At $50 a plugin, it's quite the bargain!

Limitations

- Some plugins are relatively basic, by design

One of the most respected synth companies in the world reinvents its much-missed pedal lineup through software

As synthesizer companies go, they don't come more highly prized than Moog. It was Bob Moog who solidified the subtractive concept, but it was many years later that he also invented the Moogerfooger range of pedals, which were withdrawn from sale back in 2018 after 20 years in production.

New birth to old circuits

It's only now that we can understand why the original hardware was withdrawn, as it was presumably part of Moog's plan to model their classic pedal lineup in software. It only begs the question why it took so long? The plugin suite retails as a collection; there is no option to buy individual plugins, unlike the original hardware. Also unlike the original hardware, the complete cost of the suite is a tempting and realistic prospect, while the individual hardware pedals were many hundreds of pounds each.

There are seven plugins in all, beginning with the MF-101S; it doesn't get much more classic than the Moog ladder filter, and that's essentially what we have here, albeit with a few classy Moogerfooger additions. Originally a 4-pole low-pass design, the 101s adds a 2-pole option, along with an envelope follower and overdrive. Being the first of the original Moogerfoogers, it is undoubtedly at the simpler end of business, but that should not deter us. Add this beautiful filter to any synth plugin that you may choose to muster, and you'll exaggerate those Moog-like colors with incredible speed and ease. Like most ladder filters, applying the resonance will reveal a drop in low-end signal, but the overdrive makes up the low-end gain perfectly, much like the current Moog Sub range in hardware.

The MF-102S is another classic: a Ring Modulator. The onboard virtual circuit quickly generates metallic and colorful carnage from an incoming signal, and it's worth noting that it's the original pedal hardware that currently provides the voice of the Daleks, albeit when applied to an appropriately styled actor's voice.

MF-103S is a vintage-styled phaser, complete with switching between 6/12-stage and resonance amount. The onboard LFO is DAW syncable, which is the case across all of the Moogerfooger plugins. Faster and slower free-rolling LFO rates are also available if they are preferred.

The MF-104S is a model of an analog delay. Moog have extended its usability by including additional delay types, which are accessible via the hidden settings control

> "These will find fans amongst vintage devotees and artists alike"

panel. Also equipped with independent delay time and LFO rate, this represents the last of the original Moogerfooger units, which could be regarded as more traditional in makeup.

New freqs

The next three plugins provide the later Moogerfooger designs. MF-105s is the MuRF, which provides drive and animation to any incoming signal. Patterns may be created and stored, while a fixed frequency filter operates in tandem with the animation function.

The 107s is the FreqBox, which is much like a distortion pedal on steroids. Its contemporary and metallic output is perfect for incoming synth signals, while the remaining 108S ClusterFlux takes the modulation concept to the next level, thanks to its substantial number of LFO options, coupled with flanging and chorus.

The big pedalboard

The Moogerfooger suite represents excellent value for money. In the minds of many, these pedals became vintage classics from the moment they were withdrawn from sale. The reappearance in plugin form represents the best of Moog engineering, quality and sound, coupled with the convenience of the plugin format. Unsurprisingly, all of these plugins sound pretty special. It's up to decide which you may gravitate toward, and that will be informed by your style of music and production methods. They do sound amazing, with that identifiable Moog color, and they'll find fans amongst vintage devotees and contemporary artists alike ■

Preset expandability

It won't come as a total surprise to learn that with the migration of the Moogerfoogers to the software domain, many previous functions found in the hardware have been made available to synchronize with your DAW. LFO and tempo-dependent functions will quickly lock to your set tempo. Through the use of third-party software, and appropriate interfacing, it is also possible to hardwire these effects to outboard devices such as modular. In many respects, it is the best of both worlds, particularly if you are prone to using your laptop in a live setting alongside hardware. Moog have also curated preset patches, for all of the plugins in the collection, so you can quickly get going and derive some inspiration. The fact that each of these plugins exists in its own format means that it is very easy to create chains, either made up entirely of Moogerfoogers, or with additional enhancement from other third-party software.

Three pedals, all in a line, representing the newer kids on the Moogerfooger block

SOUNDTOYS

Soundtoys 5

$499

A highly regarded suite replete with just about every high-end effect you could ever ask for.

ARTURIA

FX Collection

$420

Another collection which we found to be colorful, vintage and contemporary, in equal measure.

Arturia

MiniFreak

$630
arturia.com

By Si Truss

Strengths

+ Multitude of excellent digital synthesis engines
+ Digital effects help bring sounds to life
+ Can be used as a processor for external audio (with some very fun results!)

Limitations

- Lacks the depth of some rival digital synths, in places

The MicroFreak gets a new, polyphonic sibling. Have Arturia let the 'Freak off the leash?

Launched in 2019, Arturia's MicroFreak was a bit of an outlier – a proudly digital instrument arriving at the end of a decade dominated by affordable analog. The same can't be said about the MiniFreak. Between the likes of Korg's Wavestate, Opsix and Modwave, Modal's Cobalt and Argon synths, and Elektron's Digitone, we're arguably in the midst of a new golden age of digital hardware synths. Whereas MicroFreak undercut much of the competition, the Mini's price sees it going head-to-head with all the instruments mentioned above as well as the likes of ASM's Hydrasynth Explorer.

Despite this increased competition though, Arturia's latest Freak still feels like a unique entity. The marketing push for MicroFreak made a lot of its slightly oddball design and experimental nature, and much of that ethos is carried through. On the whole, MiniFreak is an expanded version of the MicroFreak's synth engine. As with that synth, the design here pairs multi-mode digital oscillators with an analog filter section and VCA. Again, these elements come accompanied by ADSR and cycling envelope generators, LFOs, and a flexible mod matrix to route it all.

Almost every element has been scaled up for the MiniFreak though. This starts with the hardware itself, which is considerably larger than that of the MicroFreak, making this feel more like a fully-fledged instrument. The extra size means space for a proper keyboard – as opposed to the Micro's divisive capacity keys. The 37 keys here are still 'slim', similar in size to Arturia's Keystep Pro, although they are equipped with velocity and aftertouch sensitivity, with a decent synth-action feel.

The keyboard is joined by a pair of touchstrips placed to the left at a slightly lower level to the keyboard itself. These can act as a stand-in for traditional pitch and mod wheels, control a pair of assignable macros or increase the 'Spice' and 'Dice' parameters for the sequencer.

Le Freak...

In terms of capabilities, the main upgrade from the MicroFreak is an increased voice count. Whereas the Micro could operate in paraphonic mode, the MiniFreak is capable of full six-voice polyphony with filters and modulators for each voice. There are a total of four voice modes available here: mono, poly, unison and paraphonic – where each voice's two sound engines can be used individually to play up to 12 notes.

Having dual voice engines is another major upgrade from the MicroFreak. Each is an individual digital oscillator with a total of 22

> "Users can play with complex synthesis concepts, via an easy-to-use interface"

modes available. These include straightforward synthesis approaches such as basic waveshapes or virtual analog modes, plus a variety of classic digital approaches such as two-oscillator FM, waveshaping or stacked super waves. There's also an abundance of more esoteric approaches to sound generation, such as noise, speech, formant and Karplus–strong synthesis modes. As with the MicroFreak, there's a healthy dose of influence from the modular realm here too, including several oscillator modes developed in conjunction with US brand Noise Engineering, as well as some that make use of Mutable Instruments' open source code.

The quirk of cramming such a variety of approaches into a single synth is that these often disparate methods of sound creation are required to share a unified set of controls. The most fundamental of these are simple enough – Type controls the oscillator mode itself, while Tuning and Volume are self-explanatory and act the same for all oscillator types. Sound shaping is handled by the more vaguely-titled Wave, Timbre and Shape controls, the exact functions of which change depending on the current oscillator type being employed.

This restriction to using three catch-all controls for every synthesis type can occasionally make it feel like MiniFreak is only offering a simplified version of each concept. In FM mode, for example, it allows users to set the relative ratios of the two operators but not really get under-the-hood and adjust the amplitude envelopes of either. On the whole though it's a smart, flexible approach that lets users quickly explore different sound palettes. Key to the MiniFreak's appeal is that users can experiment with these often fairly complex synthesis concepts, via an easy-to-use interface, for low-risk blind tweaking.

Arp and seq

Like most of MiniFreak's features, the sequencer and arp workflow is effectively an expanded version of MicroFreak's offering. That means that fun features such as the 'Spice' and 'Dice' parameters are carried over, which let users perform variations to the sequencer gate length, velocity, decay and introduce elements of randomization. The major upgrade here is a row of 16 buttons allowing users to easily program and engage/disengage individual steps (up to a total of 64). MiniFreak also offers chord and scale modes, simplifying pattern creation. The arp's capabilities are expanded too, with features including new playback modes, ratchets and octave randomization. As with the Micro, the sequencer also offers four channels of automation recording, along with rear panel CV/gate outputs allowing for control of analog hardware.

... C'est chic

Sound design wise, there are several advantages to having these two engines. Firstly, unlike on the MicroFreak, users can blend different synthesis approaches in a single patch. This works wonders for, say, creating rich, textured pads where a complex, modulated digital sound is underpinned by a more straightforward virtual analog one.

MiniFreak can also use the second sound engine to process the output of the first. This makes use of a variety of effect-like algorithms offering approaches such as comb filtering, surgical EQ, virtual analogue filters, ring modulation and distortion. The synth can also process sounds via its rear-panel audio input, effectively turning the whole instrument into one big filter and effects module.

On that subject, MiniFreak's other significant addition is that of a three-auxiliary, digital effect engine. There are 10 effect modules to choose from, comprising the usual suspects – a delay, reverb, distortion, EQs, compression, phaser, flanger, chorus – although most offer multiple varieties of each processor type. As with the oscillators, these use shared controls to keep editing simple. A key characteristic of these effects, however, is the fact that they all operate in stereo – taking

MiniFreak V

In a rather unusual move, Arturia are offering MiniFreak alongside an official plugin version, which comes free with the hardware synth. MiniFreak V is essentially a straight port of the digital synth engine, albeit with emulated analog elements. Unsurprisingly the plugin version sounds remarkably similar. Some patches can be shared back and forth between the two, and the hardware can be used as a controller. Interestingly, some virtual features of the UI, such as oscilloscopes for the synth engines and animated visual representations of the envelopes, make the plugin version a better environment for sound design. It's nice to have both!

advantage of the synth's rear panel stereo output – meaning they can add width and an extra dimension of movement.

Modulation is provided by two envelope generators and two LFOs. Envelope 1 is a straightforward ADSR design, while the second is a cycling envelope that can function

either as a secondary rise/fall envelope or be looped for LFO-like functionality that can be pushed into the audible range. The LFOs offer generous flexibility too, offering synced or freerunning operation, plus a variety of waveshapes and directions. There's also a custom LFO designer mode that lets users chain basic shapes to build complex modulation patterns.

Key to MiniFreak's modulation capabilities is its front panel mod matrix. This makes it simple to dial in and keep track of routings between a range of seven modulation sources and seven destinations. Of those destinations, three are user assignable, which can be set up to modulate almost any parameter controlled by a front panel rotary (the only exceptions being effect type, master volume and tempo). Similar in operation are the two macros, which can each be assigned up to four destinations that can be controlled in positive or negative directions by sweeping along the touchstrip.

Freak show

There's a lot of flexibility in this setup, although the one disappointment is that there's no way to apply modulation or macro control to the depth of another modulation routing. This means there's no easy way to, for example, set up the mod strip to increase the level of pitch modulation from an LFO to create a tremolo effect for performances.

This is one of several areas where the MiniFreak feels, at times, a touch shallower than some rivals. The modulation, while flexible, is nowhere near as deep as the complex operator-equipped setups of Korg's Wavestate, et al. When it comes down to counting voices and oscillators, MiniFreak is towards the bottom of the pack at its price point too. But the joy of MiniFreak is that it keeps its most exciting features up front, so it's easy to experiment with oscillator combinations, modulation routings and effects without getting lost in sub-menus. For all of its versatility, Arturia have done a top job of creating a UI that feels like it has no wrong answers; even if you're not interested in exploring the nuances of oscillator types, getting stuck in tends to create winning results.

We loved the MicroFreak, concluding that the "multiple oscillator modes cover a near-endless range of timbres; the filter is smooth and versatile; the Matrix invites exploratory modulation; and the performance and sequencing tools are the icing on the cake." All this remains true of the MiniFreak, but it's more of a capable studio workhorse.

Is that extra power worth the doubled price? Yes, the polyphony and effects vastly add to the usability. Conversely, however, the price point means it faces stiff competition from some digital synths. But thanks to its impressive sonic breadth, powerful sequencer and an interface that's a joy to get lost in, MiniFreak is very much a contender. ■

THE ALTERNATIVES

ARTURIA
MicroFreak
$365
If you can live without the polyphony, effects and proper keyboard, the MicroFreak offers the same basic sounds – and at half the price!
arturia.com

KORG
Opsix
$600
Korg's modern take on an FM synth also uses a multitude of digital sound approaches. Its price has come down recently too, making it something of a steal overall.
korg.com

ASM
Hydrasynth Explorer
$600
The Hydrasynth is one of the best digital synths in recent years, and this smaller sibling brings its basic workflow into a more affordable instrument.
ashunsoundmachines.com

Cherry Audio

Sines

$59

cherryaudio.com

By Dave Gale

Strengths

+ Sonically alluring synthesizer
+ Beautiful GUI which is a joy to use
+ Plentiful bounty of presets

Limitations

- None that we can think of, for this price!

Cherry Audio's newest virtual synthesizer is all about the fundamentals. We follow the Sines and head back to some waveform basics

Finding new and tempting ways to keep us synth-heads entertained is becoming an ever-increasing challenge, so it's always refreshing to see a synth with a new take on older and familiar concepts.

Going Sinusoidal

If a clue is in a name, then Sines only really tells some of the story. At the mere mention of a synthesizer with four oscillators, all of which emit Sine waves, you'd be forgiven for conjuring up visions of Yamaha-style FM synthesizers. This is part of the Sines story, but it only represents a small proportion of its capability.

The Sines interface is utterly exemplary; signal flow is relatively obvious, with an ease of modulation routing which is refreshing, alongside the immediacy and ability to apply on-board parameters to MIDI CCs or hardware. The synth window is resizeable, making it a total joy to use on a large screen, however the Focus mode will pacify any user of smaller laptop sized screens, allowing upscaling of complete areas of the panel.

The Sines signal path begins with one of four oscillators, which emit pure sine waves by default. This is confirmed by a small oscillator window, which resides at the oscillator level. Each oscillator has an independent level and pan control, both of which may be placed under modulation control. The main sonic event takes place at the oscillator's heart, with the presence of a multitude of expansive functions which will turn your plain old sine into something far richer in harmonic state. By applying feedback, changing the phase, width or shape of the sine, you can create rich and substantial oscillator shapes and textures, which then head filter-bound, in a traditional and familiar subtractive style. The filter is impressive and powerful, with full ADSR envelope control for creating harsh and resonant attacks and sweeps. Through a drop-down menu, you can switch filter modes to different low-pass styles, as well as high, band and notch-pass filters.

All mod-cons

The vast majority of Sine's controls feature a small Source button, right next door, which allows the routing of a modulation with the minimum of fuss. The sources themselves include four envelopes and LFOs alongside performance elements, but modulation is also available from the main oscillators too. This is where we delve into the realm of FM synthesis; increasing the volume of the first oscillator, while only using the remaining

Focus mode allows a quick zoom-in on your working area, for finer control

three oscillators as modulation sources, introduces all of those familiar FM tones, from clean and sharp tine pianos to gnarly and distorted waves. It makes you think how amazing the original DX7 might have been had all of the parameters been on display like they are in Sines.

Adding up

Part of the beauty of this concept is the notion that you can easily flit from subtractive to FM styles of working, and that also extends to using Sines as an Additive tone generator. Like many other four-oscillator synths before, the flexibility of having this number of oscillators, which may be hard tuned, creates a substantial number of possibilities, particularly if you employ modulation to further build or decline the overall harmonic content.

I saw the sine

To say that Cherry Audio have been on a roll lately is a considerable understatement. Sines occupies a space in their product line which is relatively unique, as it provides plenty of diversification when compared to Cherry Audio's fair share of modeled vintage stalwarts, and we're here for it.

Sines is a sonically impressive and completely immersive instrument, which invites a level of programming which is as easy as it is a delight to use. ■

Backend output

Sines offers a tremendous amount of performance possibilities, not least of all thanks to its additional operation in a standalone mode. The onboard arpeggiator is one of the more traditional varieties, while all of the aforementioned modulation options may be assigned to performance controls, which includes the implementation of aftertouch. There are also considerable backend effects on offer, from five different levels of distortion, modulation effects such as phaser and chorus, along with delay and reverb, all available simultaneously and with their own set of controls. Finally, a graphic/fixed-band EQ heads to the Master output, where a limiter will keep extreme volumes under control. As a final pseudo-analog flourish, the drift control will subtly alter the oscillator tuning, which can affect the overall tonal perception, as much as alter the behavior of FM modulation. As a sum of parts, Sines adds up to far more than its sinusoidal waveform would have you believe!

THE ALTERNATIVES

KORG
Mono/Poly V2
$99.99
One of the original four-oscillator wonders, this software version goes far beyond the original.

SPECTRASONICS
Omnisphere 2
$387
One of the industry legends. Pricey, but highly capable and desirable.

MAGNETO
ctrl-snd source
0
slightlyrand-om
undos:000
98.2%
CV IN
CV OUT
ZOIA
EUROBURO
beyerdynamic

Empress Effects

Zoia Euroburo

from $788
empresseffects.com

By Bruce Aisher

Strengths

+ Huge potential in terms of sound design and creativity
+ CV ins and outs offer plenty of potential for employing Zoia at the heart of a modular setup
+ Some individual effects modules are as good as standalone units

Limitations

- Complex setups can be tricky to edit and adjust
- Small screen can be hard to read at times unless you get very close

Empress Effects have adapted their Zoia pedal for use with modular gear. Time to get patching

To all the guitarists out there, Empress Effects probably need no introduction. Their range of guitar pedals – taking in both analog and digitally derived processors – are highly regarded. However, they largely stick to relatively common ground, in terms of guitar processing at least. When Empress' button-laden Zoia pedal arrived a few years ago, it was therefore met with intrigue and interest. Zoia – a pedal employing DSP for the hard graft – was a processor and sound generator based on modular principles. It is still available in this format, but Empress have taken the natural step of repackaging its power in a 'real' modular format – Eurorack. However, they haven't completely left those users behind who have yet to take the leap into full-on modular madness, as Zoia can also be bought in desktop form, where the Eurorack module is built into a metal case with a suitable power supply input. This also allows them to open up the system to a wider range of users. Even in its original pedal form though it wasn't just an effects processor, but a reconfigurable modular system capable of sound generation, controllable via MIDI.

The most obvious differences between the pedal and the Euroburo version is the lack of heavy-duty pedal switches, and the addition of CV inputs and outputs, a dedicated headphone jack and the use of minijacks for all audio and control connectivity. It's worth noting that presets between the two units are interchangeable, with the caveat that elements that are not present in a particular unit will merely remain inactive or placed on a blank page.

The final cut

The basic essence of creating patches on the Zoia is via the 5x8 button grid at the center of the unit. A patch consists of one or more pages of modules connected together. Modules are represented by buttons on the grid, with each button in any given module representing a specific function. Modules can interact by making connections between them – in the way that one would connect patch cables in a module system. A good example mentioned in the manual is that of controlling a VCA (Voltage Controlled Amplifier) from an LFO (Low Frequency Oscillator) to create a Tremolo effect. In this case an audio module (VCA) has one of its parameters (Audio Level) modulated by a control module (LFO). Adding a module to a page's grid is as simple as pressing an empty button/grid slot and browsing through the onscreen module categories (see over the page) using the metal parameter wheel. Clicking the wheel brings up a list of

The Modules

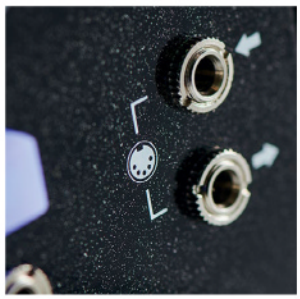
The module list is comprehensive, with modules falling into one of five categories: Interface, Analysis, Audio, CV and Effects.

Interface modules primarily deal with getting signals in and out of the Zoia, but also allow the buttons to act as controllers – even making it possible to turn the button matrix into a keyboard!

Audio modules include the usual array of synth-based sound generators and processors such as a mixer, oscillator and filters, but also pitchshifter, bit-crusher, looper, diffuser and others. The small Analysis category adds to this with onset and pitch detectors and an envelope follower.

The CV modules fall firmly in the modular universe, with classics such as an ADSR, LFO, Sample & Hold and Sequencer amongst its many other uses.

Finally, the Effects – almost worth the price of entry themselves – take in dynamic, modulation, delay and multiple reverb effects plus a cabinet simulator and distortion effects. Lots to get stuck into.



individual modules, where a further click allows you to configure its color and basic features. Once added a module fills a number of grid squares based on how many accessible parameters it has. These wrap around existing modules if space is tight. Audio and control signals are routed between modules by holding one button (source) and pressing another (destination). Adjusting the parameter knob then determines the strength of the audio/control signal. Even if using only one page, things get complex quickly, so parameters and connections can helpfully be added to a 'Starred' list for quick access.

The final cut

There's scope here for building elaborate sound generators, sound processors and utility functions beloved by modular users. The downside to all this flexibility, common to any multipurpose box, is keeping a handle on what is going on, and how to make changes easily. The screen helps, but is tiny.

That being said, even in individual modules, there is a lot of power. For example, the Flanger module is (according to Empress) borrowed from their Nebulus pedal. So you could just set up some audio in and out connectors and patch a flanger in very quickly – and swap it for another effect very easily. The point here is that you don't have to get your hands that dirty to access some very strong effects, and coming from a guitar pedal maker you'll find that the distortion-style effects stand up pretty well despite being digital in origin. The advantage of all the processing being done digitally is that the system can be easily updated, and modules have been added at various stages during the firmware development process, with more than 80 available at the time of review. There is a lot of information about module specifics in an incredibly comprehensive spreadsheet curated by Empress.

Both in standalone and Eurorack formats this version of the Zoia offers a lot to a wide range of users both in the studio and on-stage. If you don't need the CV in/out features the original pedal version might be a better fit, and less money. However, for modular fanatics the Zoia Euroburo should be added to your must-try list if you are looking for a module that can take on multiple guises with ease, and allow you to use many of them at once. ■

THE ALTERNATIVES

EMPRESS
Effects Zoia Pedal
$600
If you don't need the modular integration then the slightly simpler pedal version might be a better choice.
empresseffects.com

EXPERT SLEEPERS
Disting Mk4
$205
A slimline multipurpose utility module with over 80 algorithms that can be selected and used one at a time.
expert-sleepers.co.uk

TIPTOP
Audio Z-DSP
$436
A cartridge-based sound processor with CV control. There's a limited number of parameters and algorithms on each cartridge, but some of them are very impressive.
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AVGAUSS7 | $799.00

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IK Multimedia iLoud MTM High Resolution Compact Studio Monitor (Single, Black)
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PreSonus

Studio One 6

$450

presonus.com

By Andy Price

Bulging with new upgrades, Studio One 6 smartly tailors your workflow to be more honed than many other DAWs. But is it worth the switch?

Strengths

+ A top-notch DAW just got better with heaps of new additions
+ Smart Templates tailor Studio One into a perfectly-focused workbench
+ Edit and write to picture better using new Global Video Tracks

Limitations

- You'll need the RAM

Studio One has come a long way since finding its feet back in the 2000s. With its inaugural version released in 2009, Studio One spent the early part of the last decade gradually establishing itself into a formidable alternative to many of the more familiar heavy-hitters. Yet it wasn't until 2015's Studio One 3 that the most convincing case to ditch Live, Logic and Cubase and turn to PreSonus's burgeoning mega-DAW was made.

With subsequent iterations (4, 5 and numerous point updates) bringing slick additions like chord detection, video editing and a live performance-angled Show page, we've noted a simultaneous growth in the number of people who now point at Studio One as the most flexible DAW for their workflows. As version 6 rolls in with enhancements, speed and benefits by the truckload, we see their point.

Smart attack

Out of the box, Studio One 6's Smart Templates, go quite a way above and beyond some of the more generic DAW starting points, with smartly crafted project overlays for such jobs as stem mixing, live performance and advanced mastering. They fuse pre-determined tracks and channels with an economical user interface that only displays those elements that you require. Further workspace tailoring is provided with a new Customization Editor wherein you can scale the DAW to fit a visual theme that works for your project.

The fundamental audio mixing view seems largely unchanged since the previous version, yet there's been a definite upgrade when it comes to the overall speed of the DAW. Though not as immediately accessible as, say, Logic, Studio One 6 treats you like a pro at all times, and switching your thinking to its drag-and-drop approach doesn't take long to master. In-built plugins and effects have been spruced up, and include a new flexible Vocoder. Ostensibly a simple tool for meshing the modulation of your input synth with your vocal, it can go way beyond simple Daft Punk-emulating tasks, and work as a nifty fresh sound generator.

On the topic of vocals, and an effective De-Esser is also notable, a simple dial-based interface allows the plugin to isolate problem frequencies via a Listen button, and customize the shape and range of the subsequent de-essing

> "To put it simply, this freshly rejuvenated Studio One is an absolute joy to use"

Studio One 6's Mastering View gives forensic insight into your audio, with metering and spectrograph

to taste. Further enhancements have been applied across the board to Studio One's plugins, and while there's too much detail to delineate here, the watchwords are 'depth' and 'speed'.

The final cut

A major boon to those using Studio One 6 as their main mixing environment is Fader Flip, allowing you to control numerous FX/bus sends, side chains and Cue Mix sends directly using the main faders. It makes control of send chains easier to access and view. Panning modes have taken a leap into the 2020s, adding binaural or balanced panning modes, with dedicated controls for each. All of your mixing channel parameters can be viewed within the new Mixer Channel Overview window, floating above your main workspace. It all adds up to a more corralled mixing landscape.

Studio One 6 isn't just an enhanced modern DAW, it's also now kitted out with a slick video-oriented workflow that engenders smooth music-to-picture composition. Bolstered since the last iteration, video cutting, editing and duplication is much slicker, while the ability to hold unlimited video clips with one of its new Video Tracks will make it a very appealing prospect to those searching for an all-under-one-hood alternative to their current editing space.

To put it simply, this freshly rejuvenated Studio One is an absolute joy to use. Diving straight into our required tasks from the outset, we're able to easily guide a track to completion, set up an effortless live performance template, and even cut to video, all the while leaning solely on the DAW's roster of under-appreciated plugins and effects. A solid DAW just became a real contender. ■

Get a word in

For composers relying on Studio One to be the heart of their writing projects, the ability to apply a Global Lyrics Track to songs, scores and live sets will certainly be warmly welcomed. Requested for years, PreSonus have taken their time to create something a little more advanced than simply a pop-out text window. Instead, lyrics inputted into Studio One 6 can be assigned to specific notes, either by word or syllable. This makes the lyrics less an out-of-the-box afterthought, but an intrinsic part of your in-progress project. In practice, it's hard to think of comparable depth of lyric integration.

THE ALTERNATIVES

ABLETON
Live
From $84
While Studio One 6's live performance features are undoubtedly stage worthy, Ableton's gamut of views and uncomplicated controller integration makes it top of the tree in that regard.

STEINBERG
Cubase
From $72
On the video front, Steinberg's Cubase has long been a favorite of some of the world's most successful composers, with a massive array of frame rates, formats and a smooth editing window for deep cutting and shaping around your visuals. Cubase is equally as adept as a DAW for everything else, too!

KAITLYN AURELIA SMITH

Doyen of the Buchla and maker of modular mayhem Kaitlyn Aurelia Smith returns with a new album, the beautiful *Let's Turn It Into Sound*. Hamish Mackintosh finds out more

Hard to believe that *Let's Turn It Into Sound* is Kaitlyn Aurelia Smith's ninth album... Where does the time go? As ever, a new album from Kaitlyn is a fresh journey into her sonic world, and her latest is no exception with its rich palette of pulsing Buchla tones, intense, flickering beats and joyously manipulated vocals that see Smith pushing her own envelope further with each new collection of songs. We caught up with Kaitlyn Aurelia Smith in her LA studio, taking a break from the process of preparing for her forthcoming live shows, to talk shop and get some insight into the machinations of her workflow and ever-innovative studio experiments.

Is it true that you were given your first ever modular by a neighbor who had it sitting in his garage?

[*Big laugh*] I still think about how special that experience was... Not really knowing anything about modular synthesizers because I didn't study that in school, I studied sound engineering. Then to have a neighbor come to my place with a Buchla and say "explore this" opened up my whole world. I Googled it and only then realised what a big deal it was.

Your sound engineering background must have been handy with the technicalities of the modular environment?

Yeah, I think it's definitely helped with pathway thinking and understanding audio routing. I had a really great teacher at the school I studied at who explained how sound engineering is just an extension of the ear. That was such a beautiful way of thinking about capturing sound and I feel like it really connected me to how to approach synthesis where, instead of being an extension of the ear, it became an extension of the voice for me.

Is it the tactile/hands-on nature of modulars you enjoy?

That definitely does play into some of the joy because I have lots of energy, especially in my hands so when they have lots to do I get really excited and that helps me get into a flow state. I think I was that kid that always wanted to touch the buttons I wasn't supposed to touch [*laughs*] so maybe with synthesizers it's that there are a lot of buttons, but you're allowed to touch them.

Do you think people still assume that machines can't have 'soul'?

I love personifying machines, it's endearing thinking of them like that. It's hard to say what a lot of people feel towards machines, but I love watching my family interact with Alexa or just people in passing reacting to machines in that way. [*laughs*] It's such fun to watch people get mad at machines.

Did cutting your teeth on your neighbor's Buchla mean you've leaned solely towards West Coast modular since?

It definitely planted a seed of "what are these devices?". It started just with Buchla synths as that's what my neighbor primarily had although he also had a couple of EMS and EML ElectroComp synths too. It opened up the doorway for me to analog synthesis... modular and non-modular.

What really sparked my interest was that interaction with older components and older interactions with electricity. I've played with more contemporary modular systems a little bit. In the Eurorack world I've played around with the Make Noise system, 4ms and some other makers but I tend to always gravitate back to the older gear and back to the additive synthesis as that really resonates with me. I love the Overtone Series [*thinkspaceeducation.com/blog/overtones_pt1*], which stems back to my classical musical training and additive synthesis really lets you play with the Overtone series [*laughs*] but let's not get too into that!

> "To have a neighbor come to my place with a Buchla and say "explore this" opened up my whole world"

It's easy to imagine, with all your lovely vintage modular kit, that maintenance is an important part of your process?

Yeah, it's interesting. Back when I borrowed the Buchla 100 for about a year, I tried to buy it off my neighbor, but he said "no, I won't put that responsibility on you." I didn't understand when he said that but then, when I was able to save up and buy a few older pieces of equipment...

So I bought an EDP Wasp and some others and then I realized just how much maintenance went into just even keeping the knobs and pots from getting dusty! So, I stopped my collection at that point.

There are studios that have these vast synth collections or in LA we have the Vintage Synth Museum that has an enormous collection of old synths so now I mostly just go to all of the places where all the unicorns are carefully maintained.

You're a proud owner of the desirable Buchla Music Easel... When did you first come across those?

My partner and I bought it as a wedding present. We'd initially asked people just to donate money for us to buy a cow. [*laughs*] But then we realized how much responsibility a cow was going to be, so we got the Music Easel instead! Sometimes I think how wonderful it would be to have a cow but... no regrets. It began my whole career so definitely no regrets.

What is it you find so engaging about the Music Easel as an instrument?

At the time, it was just the only Buchla I could afford. Since then though it's become an extension of my brain because I've played with Buchla instruments so long that the language of them is so easy for me to work with. I love that it's carry-on size so I can take it on a plane with me. I think the triangle core oscillator is a sound that I really resonate with. It just feels like an extension of my voice, going back to that initial thing we were talking about. There's something about the triangle core that resonates in a similar way to how my voice resonates in my body.

It seems important to you to still find a place in your music for the human voice or real strings too though?

I think it is, for me, just because my roots started in orchestral music and as for the voice aspect, that's usually where all the songs start from. I'll get a melody, hum it for a while and then translate it to a synthesizer. So, it's always felt like a natural part of the process to, in some way or another, add the voice.

So, do you ever go to the modulars with a blank canvas, or do you tend to have an idea of what you want to do?

It's always a little bit of everything. Like, there's usually an intention and a lot of openness to surprise. Then sometimes I'll just show up, if I have the space for it, keep everything flowing and just see what happens. I like to have a daily practice playing or interacting with a synthesizer, piano or just something musical to always keep it flowing.

What were the main bits of gear you used on *Let's Turn It Into Sound*?

I used a lot of the Music Easel, the Buchla 200e and the Buchla Lightning. I have a Tom Oberheim SEM module, some Moog gear and the Wasp, of course. There's a lot of my voice and re-contextualizing my voice too.

Are you still using Ableton as your mainstay DAW for recording everything?
Yeah, I still use Ableton because it helps me with when I transition into playing live. I've already set up environments of how I recorded it because I'll usually just track the same way that I'm going to play it live when I'm recording so that I'm thinking ahead for the live show.

The first few times you took the modular gear out live must have been a bit nerve-wracking?
Oh my gosh, yes! I really like mixing myself for live shows; the way that in Ableton you can make Unity a set number... you can record what you want Unity to be. So, if I bring up a fader it doesn't necessarily go to 'zero', it goes to what you recorded it at, which means you can have your mixing preferences memorized and I really like having that ability.

Is Ableton the best DAW for working live with a modular setup?
I think it's the one that I've been most familiar with for a while now. I made a jump from Pro Tools to Ableton about eight years ago. I think DAWs in general are a case of when you learn one you want to stick with it for a while as they take a while to learn properly.

Is it Ableton's fluidity that makes it so popular with live artists?
Yeah, and I think that being able to map things is really handy. I'm sure there will be other DAWs that allow you to do that, but I haven't explored much out with Logic, Pro Tools and Ableton.

How have you managed to strike a balance between creative experimentation and just being sucked down a modular wormhole?
[*laughs*] Yeah, I still definitely do get sucked into those wormholes, but I really like them, it's a creative feeling for me. I tend to have the mindset that every sound is going to get used so I save things for later if I'm not going to use them at that moment.

There's something about the 2D screen that, at least for my brain, feels less creative to stare at for long periods of time. So, I think being able to get out of the 2D and into the 3D has been really helpful. I know that modulars are really expensive and that has been a limitation for me as well. I always like to encourage people to look into how many resources are out there for learning as that's how I was able to learn. There are so many libraries, so many residencies and so many amazing synth stores that you can go to and play with the synths.

Any thoughts of ever making a sample library from your modulars?
I haven't really thought about that but maybe someday far in the future. I don't know if I'm organized enough to do that right now. It's already such a headache for me to find my own sounds that I've been creating!

'Let It Fall' is one of several standout tracks on the album. Could you talk us through the writing of that?
That means a lot, that 'Let It Fall' resonates with you, as it's very important to me. It's a song that I made for a piece of architecture. There's a chapel on the land I grew up on and the chapel doesn't really have a religious connotation to me, it's just always been this really beautiful space that I've always gone inside and sang in. So, I wanted to make a song that was an 'ode' to the chapel so that's the song that came out for it. I've always been curious about the sort of '360 degrees' feeling of music where you can feel it all around you so that song was an exploration of how I could rhythmically create that illusion. I don't know if it worked but it was a fun exercise to play with.

Was that one of your songs where the melody came into the studio from outside?

> "I keep saying to myself that someday, if I make a lot of money, I want to make a synth library for people to come and play on synthezisers as there are so many people like me who've had to borrow synths"

Yeah, I remember laughing when the main melody came to me as it was such a weird melody. [*laughs*]; It just felt like a joke my creative self was playing on me! But it all came together and started to make sense when I put it all together... or at least it made sense to me. So, there's a lot of voice, definitely some Music Easel and some 200e on that track. There was a lot of stretching and manipulating done to my voice too.

How much do you enjoy collaborating with other artists?
I didn't actually have anyone collaborating with me on this new album, but I do enjoy collaborations as each one feels really different and magical.

Is there new material in the pipeline or do you focus on the live shows now?
Sometimes it happens that fast as it takes a while for an album to come out so there's definitely a lot of time to come up with something for the next one. For this one, though, I've been focusing so much on the live performance that I haven't started writing the next thing. I have snippets of ideas of what it might be like and I'm in the filling stage where I'm filling with lots of inspiration for it then I'll get what I call my 'inner gong' feeling and then I'm ready to make the next one.

Do you have any advice for anyone looking to start out making music with modulars?
I guess it would be to find a synth shop and spend some time trying out lots of different synthesizers to find out what sounds you resonate with. I keep saying to myself that someday, if I make a lot of money, I want to make a synth library for people to come and play on synthesizers as there are so many people like me who've had to borrow synths. Explore before buying, or if you're someone who's excited to buy then maybe start small with something fairly simple. I get blown away when I play on even those little Korg Volcas at how much you can actually do with them. So, you don't need a really big system to start making music.

Before we forget, there's a companion book that people can buy that goes with the album, isn't there?
Yeah, it goes with the album but I'm selling that separately through my Instagram on an imprint I made called Touch the Plants [*touchtheplants.com*]. It's just a little book about my own inquisitive journey with sound and it's questions that I asked myself during the process of making the album. ■

MODERN DRUM INSTRUMENTS

Get every hit right smack in the center as we take you on a tour of the top drum tools out there

Can you hear that? It's the ever-pacing tick-tock of change. Or is it a kick-snare beat? In modern music, it's pretty obvious that the drums are an intrinsic part of any beat-led music's success. Sure, every single part of your music is vital, as is the treatment and processing that helps them stick together, as we regularly spend pages and pages explaining. The drums, though, set a piece of music on the road. Done right, drums can add energy, create pace, and generally define the energy level of a piece, whatever the mood. But that's not to say that perfectly-produced drums are the goal every time. Depending on the genre, drums might need to be stunted, vibey, repetitive or simply subtle. Staying within the confines of a genre's rules may put some limits on the drum sounds and programming you use, but those drums still define the same traits of the track that they do in any other. In this article, we're going to lift the lid on some of the techniques behind getting a modern drum sound, and we'll do it through the lens of some of the best instrument plugins that you can grab today for getting your beats to the next level. We'll tackle not just heavy-hitting 'drum' instruments, but some ways to play them better as well – there's MIDI effects on display to help you get a grip on making rhythms or coming up with something new, and there are bigger packages involving a mixture of everything.

MIDI effects

'MIDI drums' is a phrase that would be unthinkable in many circles, or perhaps get you beaten up (with very consistent timing). But once you embrace the idea of programming rhythms in your DAW, you start to get access to some of the great tools out there that aim to make it simpler, more creative, and even a little bit fun. MIDI data contains a set of instructions for what an instrument – plugin, hardware, analog or digital – should play. Given the mathematical precision of digital data, and the ability to program it in advance, plugin tools have sprung up that offer a new way to get creative with beats and rhythms. Some allow you to sequence in new ways, others help you to improve what you've got already, by creating variations and humanizing programmed performances. One key way to use MIDI plugins in general, whether that's for drums or for other uses including chords, keys and arpeggios, is to use them to put you out of your comfort zone. When things get a little too comfortable, getting your creative work done using a MIDI plugin can be just the jolt you need – it forces you to think differently in order to lay down the basics, and as a result, drives you down avenues you might not have visited on your journey to an interesting, exciting and motivating beat. Below, we'll look at one of the most recent MIDI plugins to cause a stir, with its very logical way of getting things done.

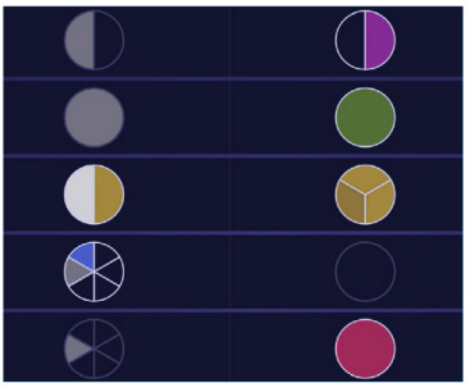
Step by step 1. Using Modalics Beat Scholar

1 Beat Scholar provides a novel way of programming drums in the digital domain, one which will send you down new creative avenues. At first glance, the plugin is laid out in a basic step sequencer format, but each step is divisible into up to 42 slices, or beats

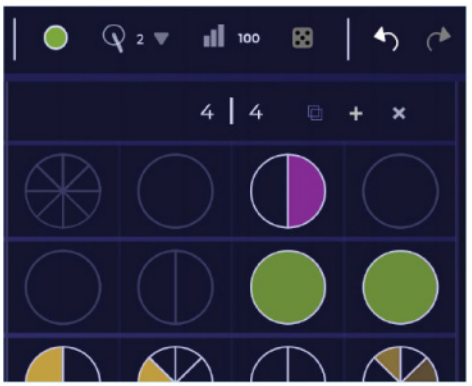
2 Hold down a number key on your keyboard and click one of the circles on the grid to change the number of beats in that step. You can also right-click a circle and select a number, or select the Slicer brush and drag up or down on a step.

3 Adding beats to a step is easy, simply choose a drum from the available options in your kit, select the Drum brush, and click into one of the slices to fill it. Once divided, circles will light up to show where each slice lies on the beat.

4 Add new channels to the sequencer by hitting the plus icon on the top left of the interface. Each channel doesn't have to be exclusively one instrument, you can fill any slice of any step with whichever drum hit you like.

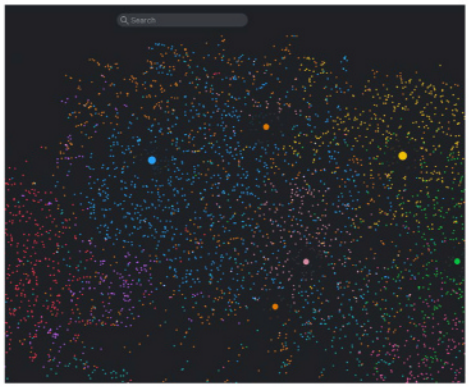


5 You can copy a pattern that you like by holding C on your keyboard, clicking a circle, and then holding V and clicking into another step. Control velocity by holding Alt or Option on your keyboard, then clicking and dragging on a slice.

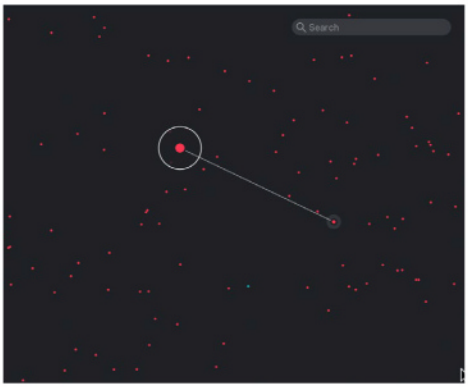


6 Add more bars by clicking the plus icon on top of the grid, or the Duplicate button to copy and paste your existing groove. The dice button randomizes slice and beat input according to the drum hit you've selected, which can be tweaked individually and treated with effects.

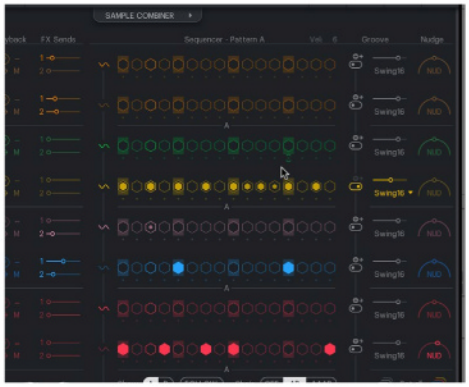
Step by step 2. Exploring sounds with XLN Audio XO



1 When you start with a preset in XLN Audio's XO, you're presented with a huge cluster of dots in different colors, each dot representing a sample, and each color representing an element of the drum kit. We can zoom in to get a better look...



2 Here's our kick and its surrounding 'similar' kicks. We can select a new one, or hot swap the kick sound, auditioning the nearby dots – or more distant ones – in situ as the MIDI plays back our main kit. And we can do this with any element of our setup.

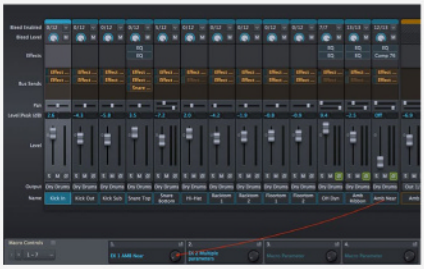


3 In the Edit window, we have a right-hand side where we can sequence the eight kit elements, programming notes by clicking, and velocities by dragging. This also gives a good opportunity to go back and amend some of your selected sounds. Any excuse to return to space.

4 On the left-hand side of the Edit window, a sample editing section lets you tune, filter, pan and do lots more to each kit element. There are also send effects giving you access to both reverb and delay per element.

Finding sounds with AI

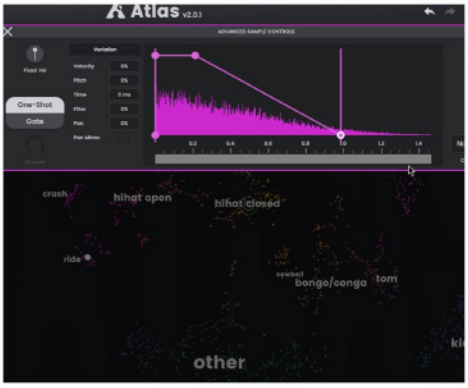
On this page we study two plugins that have a focus on finding the right sample to play each part of your drum kit. While great for sequencing and mixing in their own rights, XO and Atlas are inescapably 'about' something a little more. On each, your available sounds are laid out in a visual space and grouped by instrument (as detected by the plugin). You can then browse your available samples visually, with closer options relating to more similar sounds, and more distant ones taking you down a different sonic path. Both plugins do this a little differently, and as part of bigger larger packages, but for those who have a ton of samples on their hard drive, or those who know the importance of finding the right sound from the very start of the process, both are great ways to work.



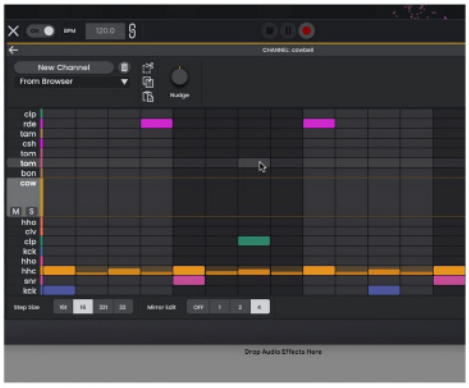
Atlas and XO have that signature sound selection 'map', but a massive amount of beatmaking tools are present in both as well.

Step by step 3. Navigating samples with Algonaut Atlas

1 Algonaut's Atlas drum machine puts drum pads and properties more upfront, letting you drag and drop sounds from its map of samples. Each area has been identified as a certain drum kit element, and you can audition any dot before dragging and dropping it onto a pad.



2 From here, you can edit its parameters, from pitching and filtering, panning and the usual, to advanced sample editing parameters: draw an envelope, choose starting time, velocity sensitivity, and so on.



3 The Sequencer pops up from below, giving you access to the pattern editing you'd expect, for whatever number of elements you've dialed in. Atlas is somewhat open-ended in this, giving you more drum pad layouts for larger 'kits', and familiar launchpad-style setups too.

Layering drums for custom sounds

Thanks for the surgical precision of computer-based production tools, it's now possible to combine different drum sounds into a hybrid that works exactly the way you want it. Each drum has a certain formulaic nature to how its sound is made up. For example, a kick drum usually consists of a low note pitchbending downward, plus a higher, noise-like 'click' element higher up the frequency spectrum. Since different drum machines' kicks – and indeed acoustic kicks – act in much the same way, you can isolate the low-end of one kick and layer it with the click of another. The precision tools necessary for this layering include filtering for each channel, and timing to ensure the two layers are playing with the right timing.

Plugins like Drum Lab (Native Instruments) use this technique to bring out hybrid drum kits modeled from both acoustic and electronic drums, giving you the best of both worlds.

When you're looking for the perfect kick, snare, tom or even hi-hat, layering gives you the customization to whip one up exactly how you like it.

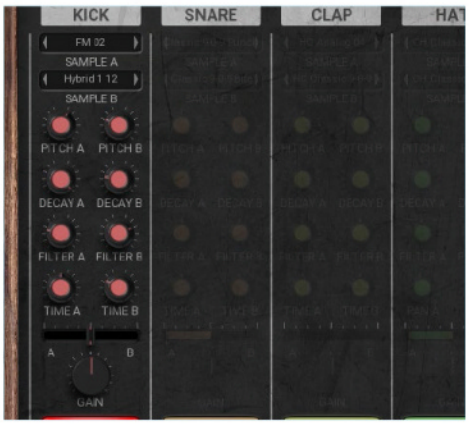
Below we'll give you some practical examples of the layering process, using MeldaProduction's recent Dream Machines instrument, which has A and B slots for each element, letting you blend between the two in level and process each with the necessary tools to fit the two together.

> "When you're looking for the perfect kick, snare, tom or even hi-hat, layering gives you the customization to whip one up exactly how you like it."

Step by step 4. MeldaProduction Dream Machines in action

1 MeldaProduction Dream Machines contains individual channels for Kick, Snare, Clap, Hat, Tom and Perc. Each of these contains an A and B part, which can be loaded with a selection of samples from the analog, digital and acoustic realms. To load a sound, click on a sample name.

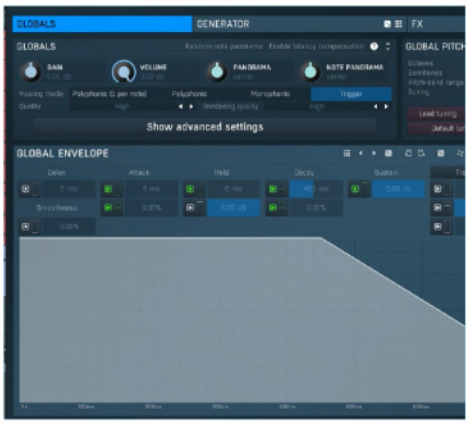
2 You can adjust each channels' level using the gain knob, and mix sample layers together using the A/B slider at the bottom of each channel. Each samples' corresponding Pitch, Decay, Filter and Time knobs let you carve space for each of the samples within the mix.



3 We'll blend a low kick's boom and another kick's transient, choosing one sample in slot A for our boom, and another kick in slot B for our transient 'click'. Dream Machines' A/B slider allows us to blend the two kicks together, and its parameters assist us in blending the parts with filtering and enveloping.

4 Dream Machines lets you do the same with snares. We select a punchy sample for slot A for the body of the hybrid sound, and a fitting transient 'crack' to go with it. As well as the pitch, decay and filter controls, you can also offset the sample start with Time if necessary.

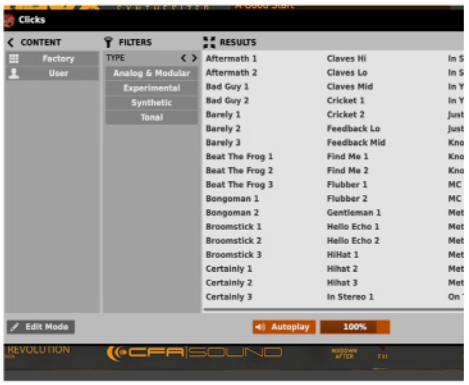
5 The Perc channel lets you choose from an assortment of source instruments. Instead of a Time control at the bottom of the channel, the Hat, Tom and perc instruments have pan controls, allowing you to create interesting layered hits with a wide stereo field.



6 Dream Machines' Edit page opens up a deeper level of control, including a number of voicing modes, envelopes, global pitch and analog controls which emulate the imperfections and inaccuracies that are commonly associated with analog drum machines.

Step by step 5. Crafting the perfect hard-hitting kick with D16 PunchBox

01 D16 Group Punchbox's signal flows from left to right, starting with four layers of kick elements before passing through four effects, then an output limiter. Each stage of the signal flow can be turned on or off by clicking on the red LED or their title bars.



02 The click layer lets you add an initial transient portion to your kick, creating a high frequency snap that can be heard on playback systems of all sizes. To select a Click sample, press the Browse button then audition the sounds in the folder by clicking on each.

03 Now add a Tops layer using the same process within the Tops module. Use the module dials to adjust each of the first three layers' volume, panning, stereo spread, EQ, decay and tune to your taste. For the Tops and Tools layers, you can also adjust the sample start point.

04 The samples contained within the Tools layer are for adding a midrange thud, which helps to give your kick a knocking presence. Select a sample from the browser, or use the Previous and Next buttons to quickly cycle through the selection of Tool samples at your disposal.

05 Now onto the main act, the kick layer. You can choose from three classic kick engines – the 909, 808 and 606, plus you can select a simple sine generator, or even add your own samples. Each of these kick generators have a different set of controls for shaping your sound.

06 Within the Kick layer, you can also toggle velocity sensitivity and keyboard tracking, giving you the choice to easily tap out a consistent kick pattern with these functions off, or create velocity sensitive tonal kick patterns with them on. The velocity setting also affects the first three kick layers.

07 Punchbox's effect cascade starts with Bitcrusher and Distortion modules. You can switch them on in the usual way, then use each of the kick layers' send dials to send them to the effect cascade. Use Bitcrusher and Distortion to add some grit and texture to your kick.

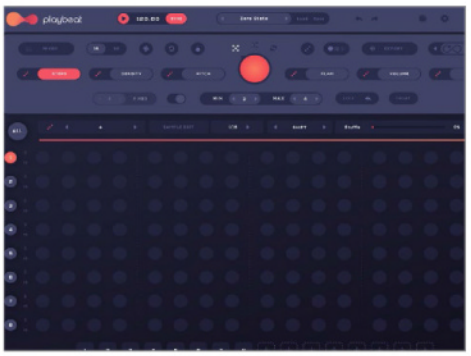
08 The next three effects in the signal flow are Filter, EQ and Limiter. Use these modules to shape the overall tone of your kick, and add level and punch using the limiter at the end of the chain. Pushing the limiter results in a colorful analog distortion style effect.

09 If you're looking for inspiration, you can use Punchbox's global preset browser, or the Randomize function along the top bar to randomize a number of the kick layer's parameters. You can prevent parameters or samples from being randomized by toggling their orange box on or off.

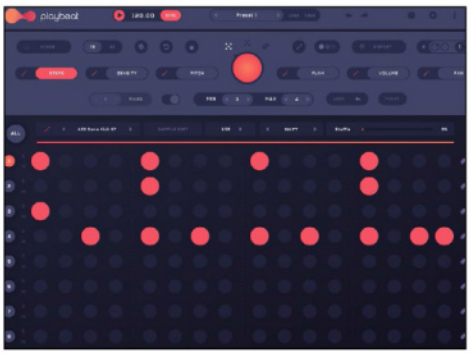
Acoustic drum plugins

No drum tools round-up would be complete without a good look at some of today's acoustic drum simulators. These plugins contain all the nuance and range you would hope for when aiming for realistic drum sounds in your DAW or driven by an electronic drum kit. So what to look for in an acoustic drum package? Firstly, size matters, but it goes both ways. A 120GB drum library will afford you many kits, all multisampled at a huge level of detail and nuance... but it'll also cost you 120GB of hard drive space! For some users, a lighter option will often prevail when the rubber hits the road. Secondly, onboard mixing controls are often very useful, although any seasoned DAW engineer might prefer to take the kit's raw sound to process using their own favorite knobs, faders and plugins.

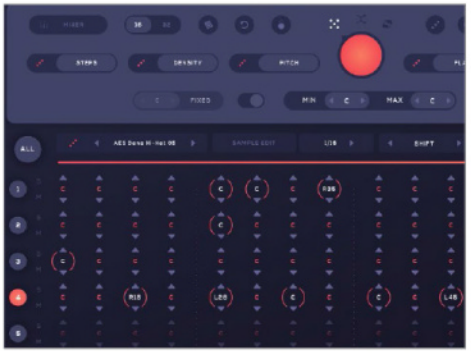
Step by step 6. Programming beats with Audiomodern Playbeat



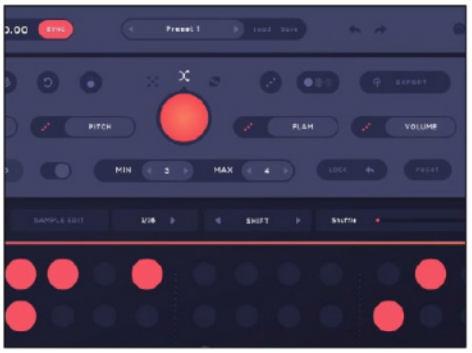
01 Audiomodern Playbeat 3 is a virtual groovebox that can handle intricate drum sequencing and intelligently generate rhythmic patterns tailored to your style. Click on any one of the plugin's eight channels and either drag a sample from your library into the sample slot, or pull up one from Playbeat's library.



02 Playbeat's sequencer can be viewed in Steps, Density, Pitch, Flam, Volume, or Pan mode. So, to program a kick drum pattern, hit the Steps icon, click on Channel 1 and simply draw in beats on the grid. Let's try out a simple kick, snare and hi hat pattern.



03 Hitting the red button randomizes your patterns, either on individual channels or as a whole. You can provide some input for this randomization according to which mode you're in, via a fixed value or given range. To randomize one setting only, like Pan, hit the dice beside the mode icon.



04 Perform minor corrective surgery on your beat with the Remix button, which makes a slight adjustment to your pattern. Infinity Mode generates a new pattern every time a new loop comes around, informed by Playbeat's SMART algorithm which continuously learns from your habits and adapts its randomized grooves.

THREE OF THE BEST

TOONTRACK
Superior Drummer 3
$397
Perhaps the ultimate drum library, with mixing controls and processors onboard, but its huge footprint for even the basic one-kit setup can make it the wrong choice for some. Toontrack also do EZdrummer for the hard-drive-disadvantaged drummer.
www.toontrack.com

STEVEN SLATE
Drums 5.5
$149
The product line that started Steven Slate on the road to mogul status, SSD is a comprehensive and well-trusted package. The latest incarnation brings in presets from landmark kits and artists to get you straight to 'those' sounds. Combine it with Slate's Trigger software and you've also got instant drum replacement power as well.
www,stevenslatedrums.com

NI
Abbey Road Modern Drummer
$99
This Kontakt instrument from Native Instruments comes alongside a few other great virtual drum kits within the Komplete package, including Abbey Road Vintage Drummer, 60s and 70s Drummer, and Studio Drummer. The packages are big enough to impress, but not so big to bloat, and come with heaps of MIDI grooves in tow, plus Kontakt mixing features.
www,native-instruments.com

Ataxia

The Detroit duo on their love of drum machines and the raw production approach behind debut LP, *Out Of Step*

Rickers and Ted Krisko are Ataxia, an electronic duo serving up a raw and unfiltered take on dance music that's inspired by formative years spent in hardcore and punk bands. The electrifying amalgam of house, techno, breakbeat and rave found on their latest release, *Out Of Step,* is produced with a formidable arsenal of analog machines, pedals and outboard gear, along with a few strategically deployed stock plugins from their DAW of choice, Ableton Live. We caught up with the pair to delve into their creative process.

When did you start making music?

Ted: Guitar in the early '90s was my initial swan dive into all the ruckus. Punk was the first route that had the most immediate gratification. Three chords, sometimes less, sometimes none. Early staples were Fugazi, Nirvana, Black Flag, Minor Threat, and loads of Beastie Boys jams. My cousin gave me an original ProCo RAT distortion fuzzbox – this set the pace early on. My bands recorded on Tascam 4-tracks relentlessly throughout my youth... things come full circle!

Rickers: I started making music genuinely when I heard The Vans Song by Suicide Machines circa 2002, although I think the original was released in '95. They inspired me to make music that was fun, purposefully lacking a 'seriousness' that would, by definition, destroy creativity. I played the bass guitar, that was the first instrument, and I was focused on making punk rock!

Tell us about your studio/setup.

Ted: We have a couple of spaces we work out of. Our main studio is in Detroit, the My Baby Records HQ... a space we share with our brother till the end, Mister Joshooa. Our collective runs the label and studio. We did a lot of damage out of the past version, but the space is currently under renovation to improve some aspects of the acoustics, and also to build soffits for our mains. Our approach is very modular, in a sense that everything lives on a patchbay, including, and maybe most importantly, the I/Os from the front end and console.

We're constantly routing and re-routing pedals, rack effects, processing gear... it's a mess! It's nice though, because we can introduce new equipment on the fly by patching into the console or soundcard on the bay, before making a full commitment as to how or if we will eventually include it in our setup. Although there's no arguing the utility of plugins, most of the work is outboard. On one hand, there's no problem with anything in-the-box, it's all about your ears and the decisions you make about the sounds in your design. On the other hand, it's fucking amazing going knob-crazy in patchbay paradise.

Our second space is a secret lair, stocked with a near carbon copy of the main studio, plus some extra processing and summing equipment, a full array of API outboard rack gear, and a dreamy boutique effects pedal setup: original Boss CH1 & BF2, Mu-Tron Phaser III, Ibanez AD9 Analog Delay with Robert Keeley Baked Mod, Fulltone

OCD. Our guitar and bass rigs live here as well... jam station central!

What DAW do you use and why?

Ted: Ableton Live. On first take, the processes seemed very user driven as far as depth and control in terms of where to take experiments. It was more complex than previous DAWs we had early beginnings with, like Fruity Loops and Reason. Richie Hawtin was using Live as a standalone DAW to produce, and as a virtual outboard effects rack for his sets, and does to this day. We were inspired by seeing a very in-the-box program used in an out-of-the-box way.

Ableton really does have it all – you can set up quick experiments with effects or processing either in line, or through sends/returns, just a few clicks away from your next weird sound! As far as what's in the box, their instruments are quality stuff! Analog is an incredible plug for making a big warm bass tone quickly. In addition to their stock EQs and compressors, plugins like Tension, Operator, and of course the basics like Sampler and Simpler, are all extremely useful and perfect for working on music without needing external instruments or outboard gear at all.

And for the noodlers, like us, Max 4 Live brings a whole modular world to the table that really gives users the power to design and deploy their own modules within Ableton's ecosystem seamlessly. Live has been a steady, reliable beast for us from the earliest days of Ataxia.

What one piece of gear in your studio could you not do without, and why?

Rickers: The Roland SH-101, tried and true. This is the building block of almost every Ataxia song since we first picked up this juggernaut. There is no oddity this synth can't help you explore. We trigger the 101's internal sequencer externally with an Elektron Analog Four's gate out – see our tips section for more on this!

What's your latest studio addition?

Ted: Handsome Audio's Zulu. It's a passive tape emulator. Transformer magic. It's kind of insane. We started by tracking with it, and quickly moved on to bussing and summing. The results have been extremely pleasing... it does what it says on the tin, tape flutter and wow without the hiss.

We usually track on a Tascam 438 cassette machine, which is wonderfully fussy but sounds incredible. I can't see tape getting replaced at our studios in any permanent capacity, but for now, it's been nice running with something new that brings the music to life in a very similar way. The Zulu really does get the drums knocking, while smoothing out transients and getting the claps and hats to gel. Time will tell once and for all – will tape continue to reign supreme, or did Handsome Audio crack the code here?!

What dream bit of gear would you love?

Ted: A combo of the API 1608 loaded, with the Studer A827 MCH 2-inch 24-track tape machine, all patched up and ready for controlled chaos.

Rickers: Fuck, lots of things, that most likely wouldn't make music any more fun. Honestly, my boy Chuck at Paxahau just got this Rigsmith Analog Dub Siren – it's tight, so maybe that.

When approaching a new track or project, where do you start?

Rickers: Drums are the core of Ataxia's vibe. Nearly all of our cuts circulate out of a drum machine riff. Our collection is pretty steep: Roland 909, 727, 707, 606, R8 and the Tanzbar MFB, Vermona DRM1, and Elektron's Rytm MK1 and 2, so we have a good deal of options for how to express that we are both the drummer. Although, despite the machines, sometimes it's just a good hip-hop or breakbeat sample to get up and running... whatever works!

We tend to get something going on a monosynth next, usually the Roland SH-101. This is routed with a delay pedal in line, which generally helps the vibe for the notes to slap back a little. Polysynth-land usually involves the Sequential Prophet 6, another core Ataxia sound. From there it's vocals and automation – really not a very long process from start to finish for us.

Once things take too long they stop being fun. When the fun stops, it usually sucks. The music we make relies on translating an energy to people on the receiving end, the goal is to get people to loosen up and have fun. Our punk roots really come through in our process – move quick, or it's dead in the water.

What are you currently working on?

Ted: We've just dropped *Out Of Step*, our debut album on Life And Death, an Italian label based in Miami, operated by our good friend DJ Tennis. It's a gatefold, double LP – 12 cuts, clocking in just under 80 minutes. Despite making music together for 13 years, and dropping dozens of singles & EPs, this is Ataxia's first venture into LP territory. It features good friends and fellow Detroiters Andrés, DJ Minx and Mister Joshooa. Give it a listen and leave a Yelp review!

Past this, we have a nice follow-up on deck for Life And Death, plus new material forming for a return to 20/20 Vision, finishing a record for Mike Shannon's Cynosure. Cooking up something with Paul Woolford/Special Request tool. Artists and labels we hold in high esteem. ■

ATAXIA'S TOP TIPS

Don't overthink 'making a hit' or 'writing a song'

1 For us, making dance cuts, it's about getting a groove going with a bit of kick, hat, snare... then immediately starting experiments with a couple of pieces of gear until you get something that sounds and feels good. A quick riff on a monosynth, some lush pads on a multi-voice instrument, a triggered sequence lead to coast on top, a tight vocal sample to sprinkle in here or there, and boom, you're off to the races.

Trigger internal sequencers on your synths externally

2 Mathew Jonson did some lectures on his setup with the Cirklon triggering the internal sequencer on the Roland SH-101, and it changed the game for how we tackle the MIDI implementation throughout our studios' jam stations. In our studio, any device with a sequencer and a 'Trigger Out' becomes a deadly weapon, however complex, reduced to a simple task of sending pulse information to step the internal sequencers on synths like the 101 and Prophet 6. The connection happens with a cable from the external device's trig out, into 'EXT CLK IN'. Sync your external device being used to send triggers to a MIDI clock from your session, and now you're in the pocket with a jazzy approach to jamming your note picks. This changes our approach to both how synths are used as modules, and as sequencers, and is a nice workaround, as you can even be triggering an additional synth that may not even have an internal sequencer of its own, but can benefit from being downstream from a MIDI cabling path with a synth prior to it.

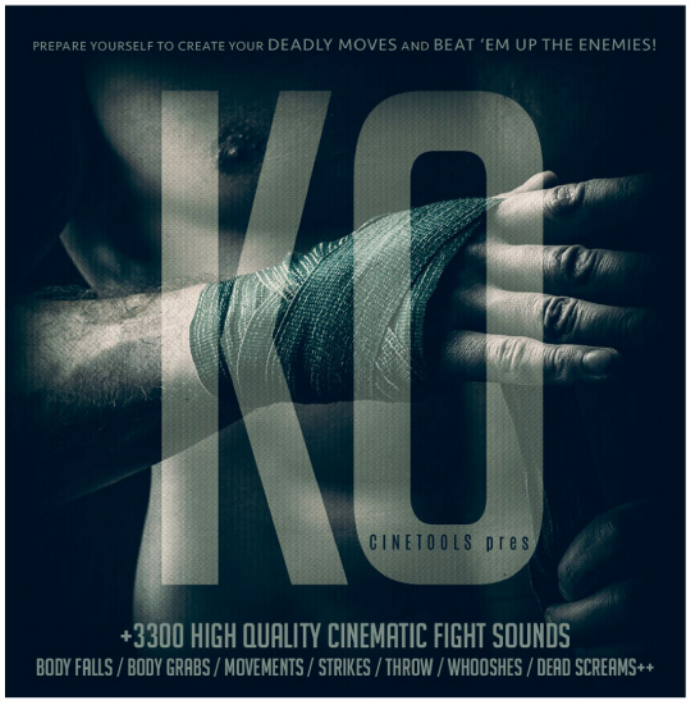
Let the LFOs do the heavy lifting

3 LFOs are technology's gift to us. Vermona's Filter Lancet is a supreme distortion box melded with a hard-ass LFO, switchable LPF/HPF, pre-volume circuit gain that can quickly overdrive the most sterile of samples into something interesting. Another irreplaceable gem would be the Sherman Filterbank, a major wormhole of odd filtering, modulation and frequency manipulation.

Cinetools

Knockout

$128



Looking for bone-snapping noises to take your martial arts flicks to the next level? Or, simply sourcing some seriously scathing strike sounds for your next sick fight scene? Cinetools have got all that, and more, on their latest high-quality, close combat, SFX library.

Thousands of explosive punches and kicks are at the heart of this pulse-quickening collection of fight-miked audio. But, there's also a mind-boggling amount of heavy panting, shouting, shuffling, grabbing, throwing, and falling in the mix, too. All here to help soundtrack kick-ass kickoffs, and every other size or scrap and skirmish you can imagine.

From a swift bop on the beak, to the most epic boss battle, you've got it all in this absolutely massive, and precisely presented, 3.50GB package. Punchy!

Roy Spencer **loopmasters.com**

Audiotent
Duality
$55

Super sumptuous set of presets for Arturia's Jun-6V – the cracking soft synth modeled on the Juno-6. Fans of Roland's seminal analog synth have had a hoot with its digital doppelgänger, and with this release they get more sensationally sculpted sonics to play around with. From housey bass stabs and funky low-end rhythms, to glassy leads and undulating tops – both sides of the face of this god-like machine are honoured. The pad tones are given a new lease of life, too, with each new preset tweaking more depth and drama out of the guts of the software than ever before. If you love your Jun-6V, you owe it this upgrade.

Roy Spencer
audiotent.com

Renegade Audio
808 Dub
$18

Fantastic set of cone-shaking bass sounds inspired by the most iconic drum machine of its generation. The timeless tone of the Roland TR-808 can be found at the heart of street tough boombox beats, digital reggae bangers, bouncy house hits, techno face melters, or anything else that needed its bottom end taken care of. Here, the pack focuses on 140bpm G minor dub – that Toddla T-style, detuned low kick vibe. But, as with any sample series, you can drag and drop these bass patterns, and bonus drums and synths, onto anything you damn please. The loops, MIDI files, and one-shots in this easy-on-the-wallet library will be in your collection for years.

Roy Spencer **loopmasters.com**

Montage by Slice
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